Chapter 4

Air Basin Trends and Forecasts -- Criteria Pollutants

Introduction

In addition to the peak indicator, there are several other air quality statistics provided in this chapter and in the appendices. These include the fourth highest 1-hour ozone concentration in three years, which is summarized from the monitoring data, and the average of the 4th highest 8-hour ozone concentrations in three years, which is a calculated value. These values are provided for the five major air basins in this Chapter and for individual counties in Appendix A.

In many cases, these two statistics represent the national 1-hour and national 8-hour ozone design values, which are used to determine an area's attainment status. These calculations do not reflect data completeness requirements or the boundaries of a nonattainment area, which may differ from county or air basin boundaries in some parts of California. Design values are available on the web at *www.arb.ca.gov/airqualitytoday* under "current year's air quality." When evaluating these statistics, keep in mind that they represent data for a three-year period. For example, the 2003 fourth highest 1-hour ozone concentration in three years represents data for the period 2001-2003.

Days above the State or national standards (exceedance days) often fluctuate when comparing one year to another. When characterizing a percentage increase or decrease in exceedance days, this almanac compares three-year average. For example, exceedance days for 1984, 1985, and 1986 are averaged and then compared to exceedance days for the years 2002, 2003, and 2004, which are also averaged. This gives a much more stable indicator of long-term progress.

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South Coast Air Basin

Introduction - Area Description

The South Coast Air Basin is California's largest metropolitan region. The area includes the southern two-thirds of Los Angeles County, all of Orange County, and the western urbanized portions of Riverside and San Bernardino counties. It covers a total of 6,480 square miles, is home to more than 43 percent of California's population, and generates about 29 percent of the State's total criteria pollutant emissions.

The South Coast Air Basin generally forms a lowland plain, bounded by the Pacific Ocean on the west and by mountains on the other three sides. In terms of air pollution potential, there are probably few areas less suited for urban development. The warm sunny weather associated with a persistent high pressure system is conducive to the formation of ozone, commonly referred to as "smog." The problem is further aggravated by the surrounding mountains, frequent low inversion heights, and stagnant air conditions. All of these factors act together to trap pollutants in the air basin.

Pollutant concentrations in parts of the South Coast Air Basin are among the highest in California. As a result, controlling the contributing emission sources poses a great challenge to State and local air pollution control agencies.

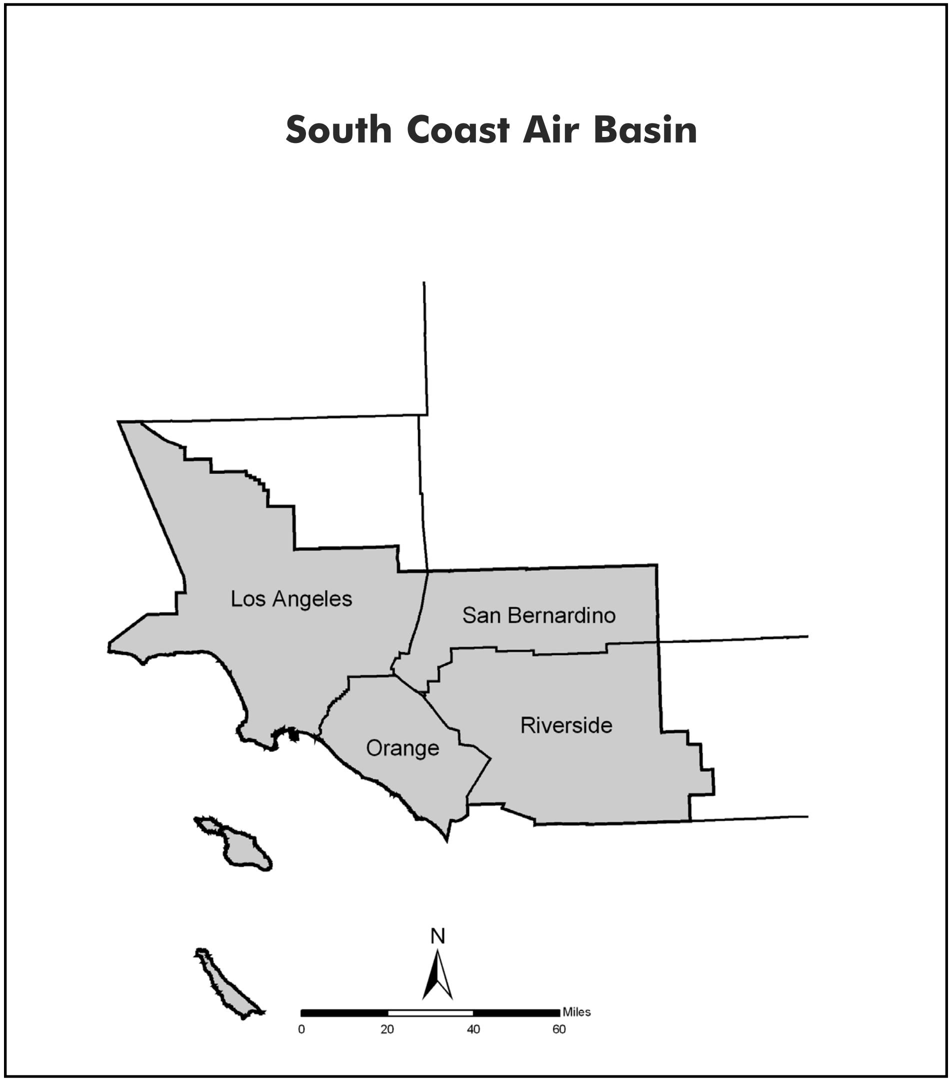

Figure 4-1

South Coast Air Basin

Emission Trends and Forecasts

Overall, since 1975 the emission levels for CO and the ozone precursors NO_x and ROG have been decreasing in the South Coast Air Basin and are projected to continue decreasing through 2020. The decreases are predominantly due to motor vehicle controls and reductions in evaporative emissions. In the South Coast Air Basin, on-road motor vehicles are the largest contributors to CO, NO_x, and ROG emissions. Other mobile sources are also significant contributors to CO and NO_x emissions. State Implementation Plan (SIP) and conformity inventory forecasts may differ from the forecasts presented in this almanac. For more information on these forecasts, please see the ARB SIP web page at *www.arb.ca.gov/sip/sip.htm*.

South Coast Air Basin Emissions (tons/day, annual average)										
Pollutant	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
NOX	1723	1641	1741	1588	1331	1195	970	763	600	515
ROG	2725	2364	2324	1775	1288	998	710	602	563	549
PM10	236	247	274	343	325	293	296	303	309	317
PM25	124	116	117	129	112	111	113	114	116	119
CO	16154	13382	13140	10322	7574	5533	3953	3062	2519	2184

Table 4-1

South Coast Air Basin

Population and VMT

Both population and the daily VMT will grow at high rates in the South Coast Air Basin from 1980 to 2020. While high growth rates are often associated with corresponding increases in emissions and pollutant concentrations, aggressive emission control programs in the South Coast Air Basin have resulted in emission decreases and a continuing improvement in air quality.

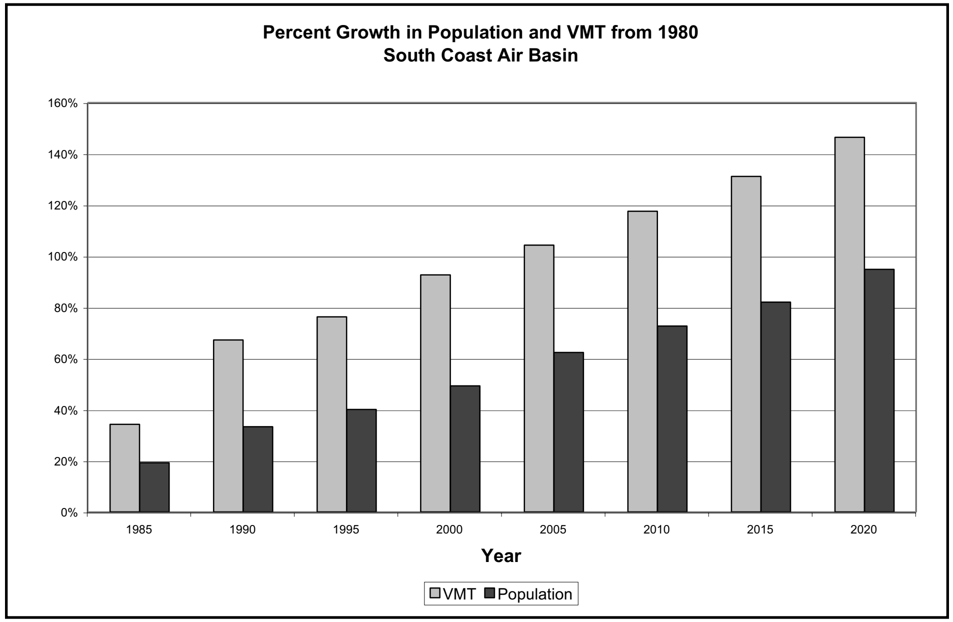

Figure 4-2

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population(1000s)	10605	11698	13084	13745	14654	15933	16946	17862	19122
Avg. Daily VMT(1000s)	158732	221550	275902	290888	317873	337083	358938	381397	406622

Table 4-2

South Coast Air Basin
Ozone Precursor Emission - Trends and Forecasts

Emissions of the ozone precursors NO_x and ROG in the South Coast Air Basin are generally following the statewide downward trend. Motor vehicle miles traveled in the basin are increasing, but NO_x and ROG emissions from on-road vehicles are dropping as more stringent vehicle emission standards have been adopted. These decreases in NO_x and ROG emissions are projected to continue between 2000 and 2020, as even more stringent motor vehicle standards are implemented and as newer, lower-emitting vehicles become a larger percentage of the fleet. NO_x emissions from electric utilities in the air basin have declined substantially since 1975, despite a nationwide increase in emissions from electric utilities in the same time period. These large reductions are primarily due to increased use of natural gas as the principal fuel for power plants, and control rules that limit NO_x emissions.

NO_x Emission Trends (tons/day, annual average)

Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	***1723***	***1641***	***1741***	***1588***	***1331***	***1195***	***970***	***763***	***600***	***515***
Stationary Sources	327	291	254	185	120	105	71	68	68	70
Area-wide Sources	31	34	35	29	27	30	32	27	26	26
On-Road Mobile	1026	954	1094	1000	869	751	581	426	282	196
Gasoline Vehicles	921	768	788	700	594	432	270	186	129	92
Diesel Vehicles	105	186	306	299	275	319	311	239	153	103
Other Mobile	339	362	358	374	315	309	286	242	224	223
Gasoline Fuel	20	21	22	24	22	25	26	22	19	19
Diesel Fuel	292	313	307	315	257	247	225	188	170	166
Other Fuel	26	28	29	35	36	37	35	33	34	38

Table 4-3

ROG Emission Trends (tons/day, annual average)

Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	***2725***	***2364***	***2324***	***1775***	***1288***	***998***	***710***	***602***	***563***	***549***
Stationary Sources	649	561	559	462	258	195	132	141	154	170
Area-wide Sources	205	218	236	225	197	195	172	161	168	175
On-Road Mobile	1684	1387	1317	860	618	413	276	196	148	115
Gasoline Vehicles	1678	1376	1299	845	606	402	265	187	140	109
Diesel Vehicles	6	12	18	15	12	11	11	9	8	6
Other Mobile	188	198	212	228	215	196	131	104	93	88
Gasoline Fuel	152	161	176	191	183	164	101	77	69	65
Diesel Fuel	29	30	29	30	25	24	22	18	16	14
Other Fuel	7	7	7	7	7	8	8	8	9	10

Table 4-4

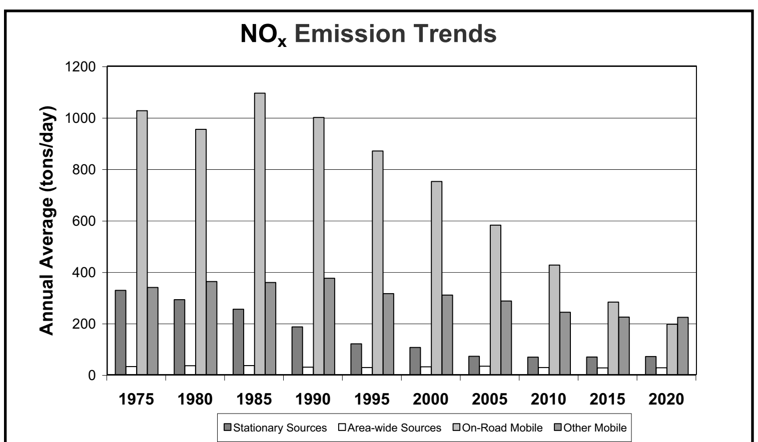

Figure 4-3

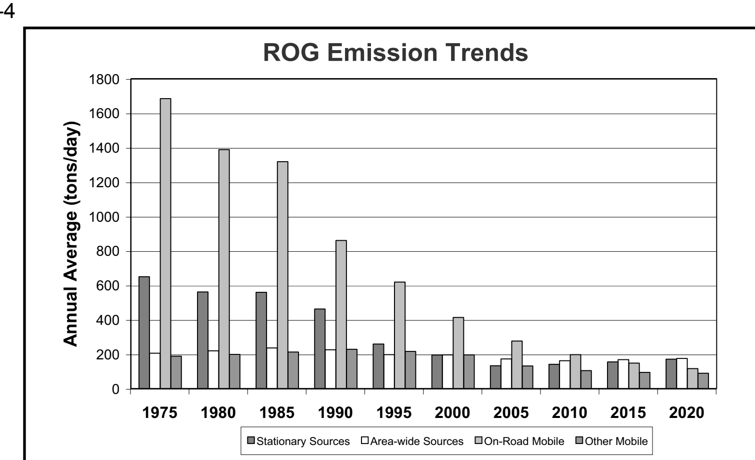

Figure 4-4

South Coast Air Basin

Ozone Air Quality Trend

Air quality as it relates to ozone in the South Coast Air Basin has improved substantially over the last 30 years. During the 1960s, maximum 1-hour concentrations were above 0.60 parts per million. Today, the maximum measured concentrations are less than one-third of that. All of the ozone statistics show an overall, steady decline. Although the 2003 ozone season in the South Coast was severe, the 2003 peak 1-hour indicator value is more than 49 percent lower than the 1984 value. The 2004 three year average of the maximum 1-hour concentration is almost 53 percent lower than 1984. The number of days above the standards has declined dramatically. The downward trend for 8-hour ozone is similar to that for 1-hour.

The ARB has identified the South Coast Air Basin as a transport contributor to several downwind areas -- the Mojave Desert Air Basin, the Salton Sea Air Basin, the San Diego Air Basin, and the South Central Coast Air Basin. As ozone concentrations in the South Coast Air Basin decline further, the transport impact on the downwind areas should also decrease.

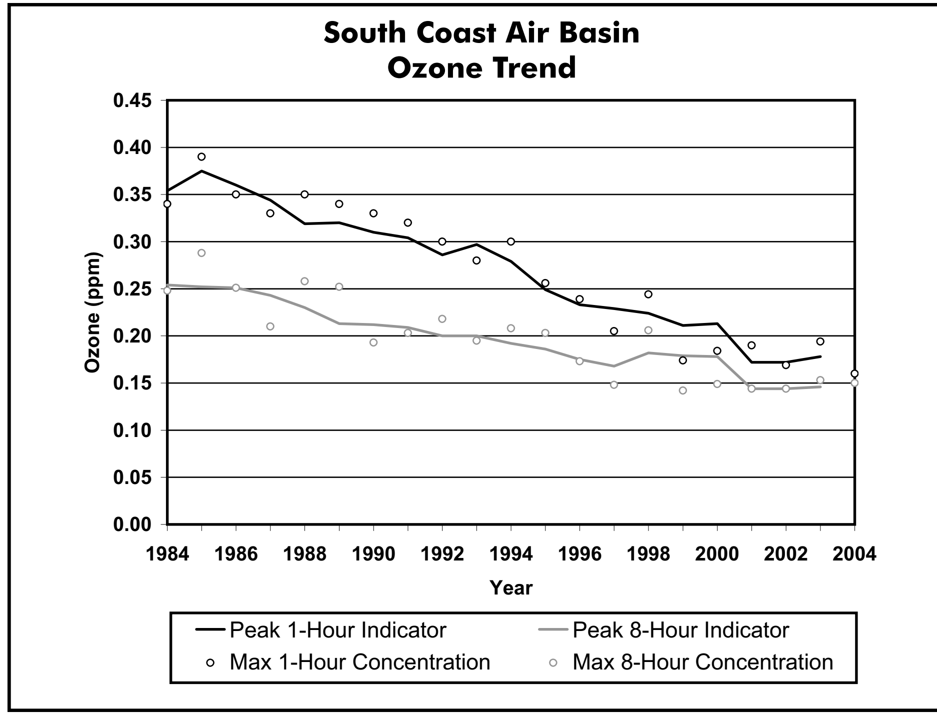

Figure 4-5

OZONE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004[1]
Peak 1-Hour Indicator	0.354	0.375	0.360	0.344	0.319	0.320	0.310	0.304	0.286	0.297	0.279	0.249	0.233	0.229	0.224	0.211	0.213	0.172	0.172	0.178	
Peak 8-Hour Indicator	0.254	0.252	0.251	0.243	0.230	0.213	0.212	0.209	0.200	0.200	0.192	0.186	0.175	0.168	0.182	0.179	0.178	0.144	0.144	0.146	
4th High 1-Hr. in 3 Yrs	0.360	0.360	0.350	0.350	0.340	0.330	0.330	0.310	0.300	0.300	0.280	0.250	0.231	0.215	0.217	0.211	0.211	0.170	0.169	0.180	
Avg. of 4th High 8-Hr. in 3 Yrs	0.225	0.226	0.222	0.217	0.205	0.192	0.186	0.182	0.180	0.177	0.171	0.165	0.161	0.148	0.154	0.147	0.146	0.129	0.128	0.131	
Maximum 1-Hr. Concentration	0.340	0.390	0.350	0.330	0.350	0.340	0.330	0.320	0.300	0.280	0.300	0.256	0.239	0.205	0.244	0.174	0.184	0.190	0.169	0.194	0.160
Maximum 8-Hr. Concentration	0.248	0.288	0.251	0.210	0.258	0.252	0.193	0.203	0.218	0.195	0.208	0.203	0.173	0.148	0.206	0.142	0.149	0.144	0.144	0.153	0.150
Days Above State Standard	209	207	217	196	216	211	185	184	190	185	165	153	141	144	107	111	115	121	116	125	110
Days Above Nat. 1-Hr. Std.	175	158	167	161	178	157	131	130	142	124	118	98	85	64	60	39	33	36	45	64	27
Days Above Nat. 8-Hr. Std.	190	181	191	179	194	181	161	160	173	161	148	120	115	118	93	93	94	92	96	109	88

[1] Preliminary data for January through October 2004 are shown here, however they are subject to change. 2003 is the last year for which complete and approved data is available, thus annual statistics are not included.

Table 4-5

South Coast Air Basin
Directly Emitted PM_{10} Emission Trends and Forecasts

Direct emissions of PM_{10} have been increasing in the South Coast Air Basin since 1975. A decrease in emissions would have been observed, if not for growth in emissions from area-wide sources, primarily fugitive dust from paved and unpaved roads and other sources. The increase in activity of these area-wide sources reflects the increased growth and VMT in the air basin.

Particulate matter can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia (secondary PM). The PM_{10} emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM_{10} emissions contribute approximately 65 percent of the ambient PM_{10} in the South Coast Air Basin.

Directly Emitted PM_{10} Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***236***	***247***	***274***	***343***	***325***	***293***	***296***	***303***	***309***	***317***
Stationary Sources	55	38	26	26	17	16	17	18	19	20
Area-wide Sources	143	166	200	269	268	238	239	247	252	259
On-Road Mobile	15	17	24	22	19	19	19	19	20	20
Gasoline Vehicles	10	8	9	10	11	12	13	15	16	17
Diesel Vehicles	5	9	15	12	8	6	6	4	3	3
Other Mobile	24	25	24	26	21	21	21	19	19	18
Gasoline Fuel	3	3	3	4	4	4	5	5	6	6
Diesel Fuel	20	21	20	21	16	15	15	13	12	11
Other Fuel	1	1	1	1	1	1	1	1	1	1

Table 4-6

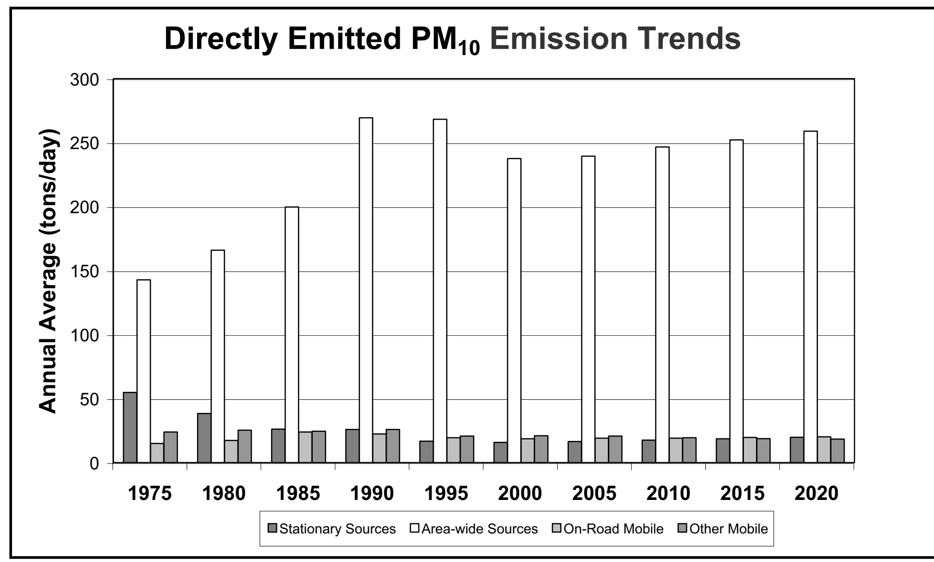

Figure 4-6

South Coast Air Basin

Directly Emitted $PM_{2.5}$ Emission Trends and Forecasts

Direct emissions of $PM_{2.5}$ have decreased slightly in the South Coast Air Basin since 1975. Stationary source emissions have been decreasing, while area-wide emissions have been increasing. A more significant decrease in emissions would have been observed, if not for growth in emissions from area-wide sources, primarily fugitive dust from paved and unpaved roads and other sources. The increase in activity of these area-wide sources reflects the increased growth and VMT in the air basin.

Particulate matter can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia (secondary PM). The $PM_{2.5}$ emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted $PM_{2.5}$ emissions contribute approximately 40 percent of the ambient $PM_{2.5}$ in the South Coast Air Basin.

Directly Emitted $PM_{2.5}$ Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***124***	***116***	***117***	***129***	***112***	***111***	***113***	***114***	***116***	***119***
Stationary Sources	51	32	21	22	14	13	14	15	15	16
Area-wide Sources	41	47	56	67	66	66	68	70	72	74
On-Road Mobile	11	13	19	17	14	13	13	13	13	13
Gasoline Vehicles	6	5	5	6	6	7	8	9	10	10
Diesel Vehicles	5	9	14	11	8	6	5	4	3	3
Other Mobile	22	23	22	23	18	19	18	17	16	16
Gasoline Fuel	2	2	2	3	3	3	4	4	4	5
Diesel Fuel	19	20	19	20	15	14	13	12	11	10
Other Fuel	1	1	1	1	1	1	1	1	1	1

Table 4-7

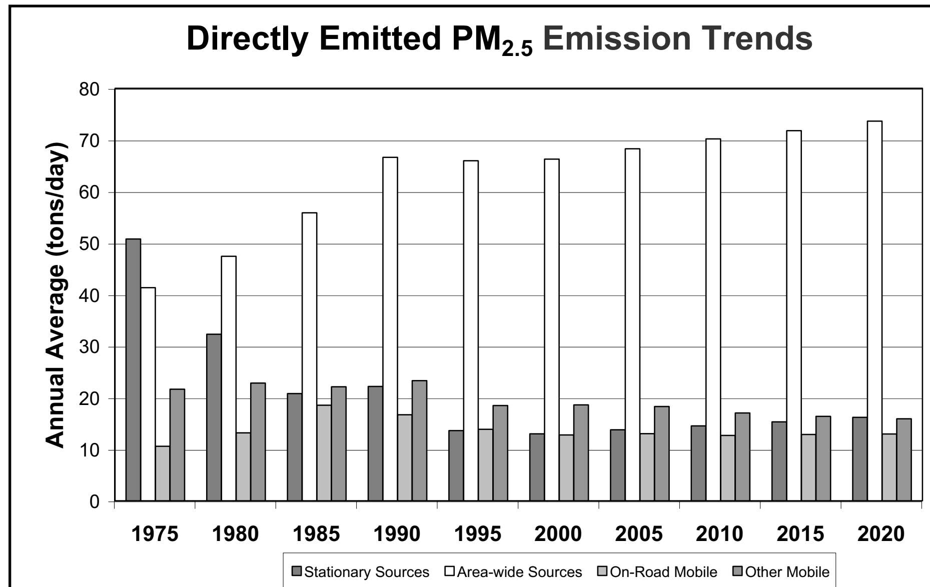

Figure 4-7

South Coast Air Basin

PM_{10} Air Quality Trend

As with other pollutants, the PM_{10} statistics also show overall improvement. During the period for which data are available, the three year average of the annual average of quarters (State) decreased about 28 percent. Although the values in the late 1990's show some variability, this is probably due to meteorology rather than a change in emissions. Despite the overall decrease, ambient concentrations still exceed the State annual and 24-hour PM_{10} standards. Similar to the ambient concentrations, the calculated number of days above the 24-hour PM_{10} standards has also shown an overall drop. During 1988, there were 345 calculated days above the State standard and 44 calculated days above the national standard. By 2003, there were still 252 calculated State standard exceedance days. In contrast, there were only six national standard exceedance days.

Despite these decreases, PM_{10} continues to pose a significant problem in the South Coast Air Basin. While emission controls implemented for ozone will also benefit PM_{10}, more controls aimed specifically at reducing PM_{10} will be needed to reach attainment.

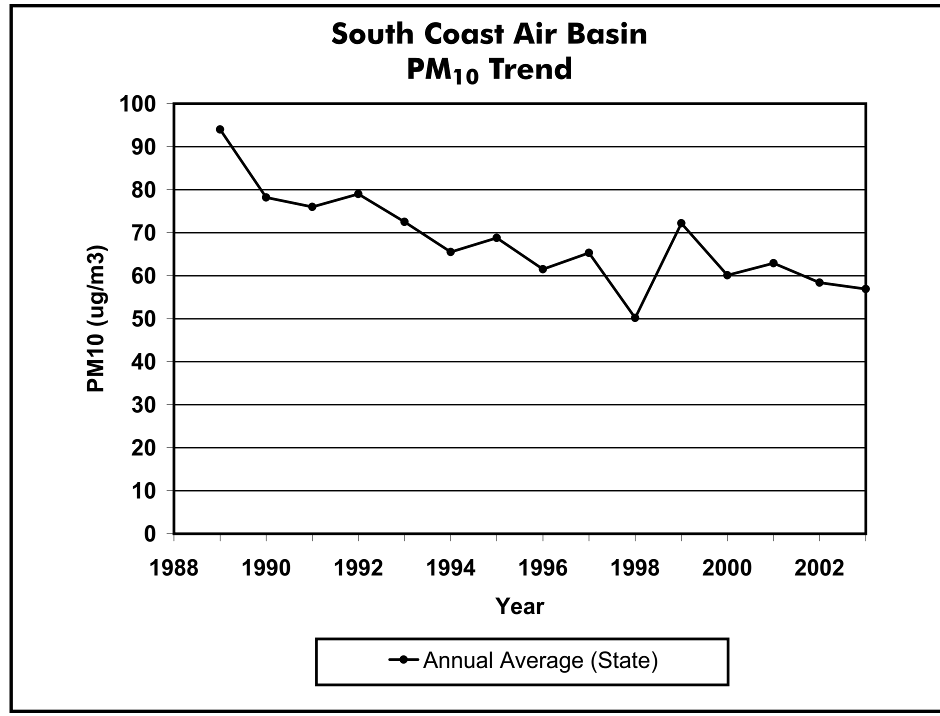

Figure 4-8

PM10 (ug/m3)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Maximum 24-Hr. Concentration (State)					287	271	475	179	649	231	161	219	162	208	116	183	139	219	130	164
Maximum 24-Hr. Concentration (Nat)					289	271	475	179	649	231	161	219	162	208	116	183	139	219	130	164
Annual Average (State)						94.0	78.2	76.0	79.0	72.5	65.5	68.8	61.5	65.3	50.2	72.2	60.1	62.9	58.4	56.9
Annual Average (Nat)					94.5	93.0	78.2	76.1	79.0	72.5	65.5	68.8	62.8	65.6	50.2	72.2	59.1	63.3	58.1	55.6
Calc Days Above State 24-Hr Std					345	338	301	294	282	293	276	252	276	290	238	288	300	278	297	252
Calc Days Above Nat 24-Hr Std					44	32	33	15	24	12	3	31	6	17	0	6	0	5	0	6

Table 4-8

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South Coast Air Basin
Carbon Monoxide Emission Trends and Forecasts

Emissions of CO have been trending downward since 1975 in the South Coast Air Basin even though motor vehicle miles traveled have increased and industrial activity has grown. On-road motor vehicle controls are primarily responsible for this decline in emissions of CO. Stationary source emissions decreased during the 1970s and 1980s as a result of a decline in the manufacture of carbon black (a material used in the manufacture of tires) and steel in the South Coast Air Basin. CO emissions from other mobile sources are projected to decrease as more stringent emission standards are adopted.

CO Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***16154***	***13382***	***13140***	***10322***	***7574***	***5533***	***3953***	***3062***	***2519***	***2184***
Stationary Sources	296	287	75	100	65	52	88	91	94	97
Area-wide Sources	54	51	82	70	87	142	158	161	166	170
On-Road Mobile	14571	11754	11622	8690	6153	4207	2705	1883	1334	956
Gasoline Vehicles	14546	11708	11545	8623	6093	4154	2654	1839	1295	920
Diesel Vehicles	25	47	78	67	60	52	51	44	39	36
Other Mobile	1233	1289	1361	1463	1269	1132	1003	927	926	961
Gasoline Fuel	1027	1076	1156	1251	1080	952	823	743	735	761
Diesel Fuel	116	121	119	123	97	85	77	73	71	72
Other Fuel	91	92	86	89	92	94	102	111	120	129

Table 4-9

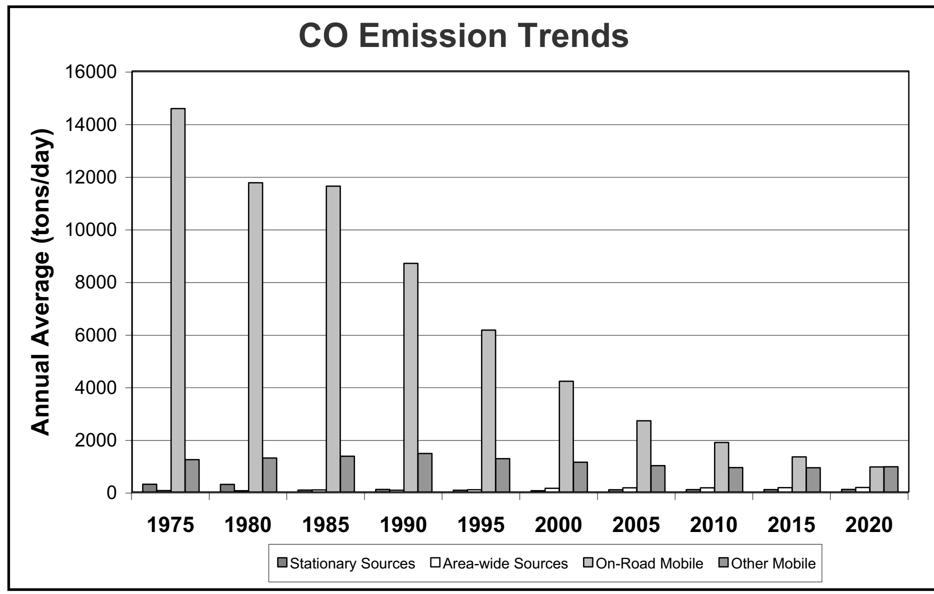

Figure 4-9

South Coast Air Basin

Carbon Monoxide Air Quality Trend

Carbon monoxide concentrations in the South Coast Air Basin have decreased markedly -- a total decrease of more than 56 percent in the maximum peak 8-hour indicator since 1984. The number of exceedance days has also declined. There were 79 days above the State standard and 66 days above the national standard during 1984. However, during 2003, there were no exceedance days for either standard.

While the entire South Coast Air Basin is designated as nonattainment for the national CO standards and Los Angeles County is designated as nonattainment for the State standards, CO violations have been limited to a small portion of Los Angeles County. The South Coast Air Basin now qualifies as attainment for both the national and State CO standards. No violations have occurred in the other three counties since 1992. Continuing reductions from motor vehicle control programs should continue the downward trend in ambient CO concentrations.

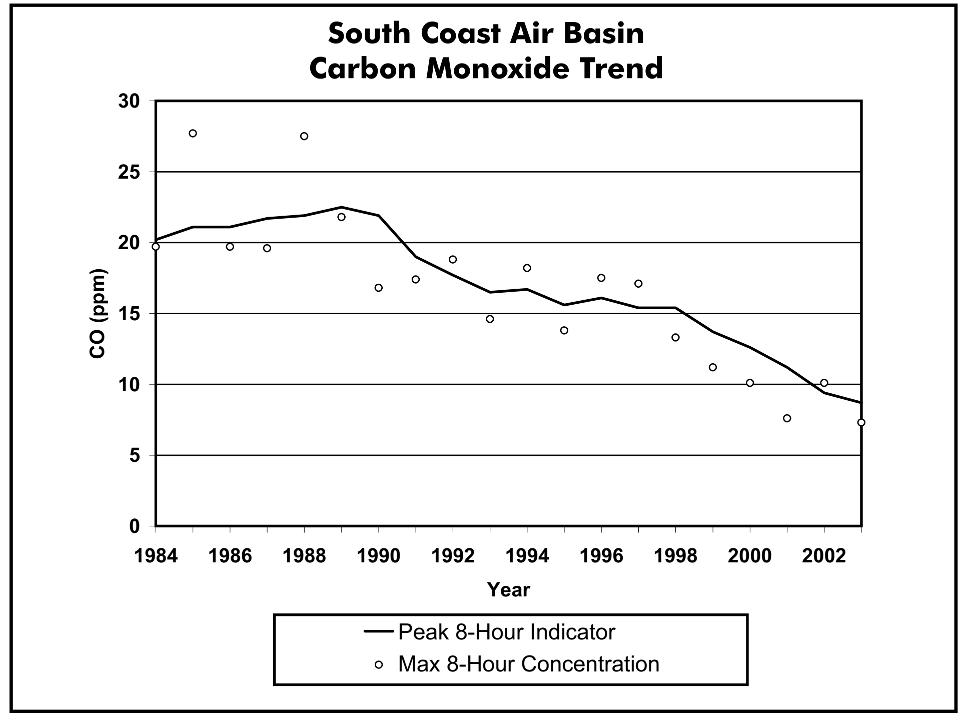

Figure 4-10

CARBON MONOXIDE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Peak 8-Hr. Indicator	20.2	21.1	21.1	21.7	21.9	22.5	21.9	19.0	17.7	16.5	16.7	15.6	16.1	15.4	15.4	13.7	12.6	11.2	9.4	8.7
Maximum 1-Hr. Concentration	29.0	33.0	27.0	26.0	32.0	31.0	24.0	30.0	28.0	21.0	24.9	16.8	22.5	19.2	17.0	19.0	13.8	11.7	15.8	12.2
Maximum 8-Hr. Concentration	19.7	27.7	19.7	19.6	27.5	21.8	16.8	17.4	18.8	14.6	18.2	13.8	17.5	17.1	13.3	11.2	10.1	7.6	10.1	7.3
Days Above State 8-Hr. Std.	79	64	58	50	73	71	50	51	39	29	27	17	26	18	13	11	6	0	1	0
Days Above Nat. 8-Hr. Std.	66	54	49	40	65	67	42	41	34	19	19	14	19	13	10	7	3	0	1	0

Table 4-10

South Coast Air Basin

Nitrogen Dioxide

Oxides of Nitrogen Emission Trends and Forecasts

Oxides of Nitrogen (NO_x) and Nitrogen Dioxide (NO_2) emissions in the South Coast Air Basin have been trending downward since 1985. This decline should continue as more stringent motor vehicle and stationary source emission standards are adopted and implemented.

NO_x Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***1723***	***1641***	***1741***	***1588***	***1331***	***1195***	***970***	***763***	***600***	***515***
Stationary Sources	327	291	254	185	120	105	71	68	68	70
Area-wide Sources	31	34	35	29	27	30	32	27	26	26
On-Road Mobile	1026	954	1094	1000	869	751	581	426	282	196
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Gasoline Fuel	20	21	22	24	22	25	26	22	19	19
Diesel Fuel	292	313	307	315	257	247	225	188	170	166
Other Fuel	26	28	29	35	36	37	35	33	34	38

Table 4-11

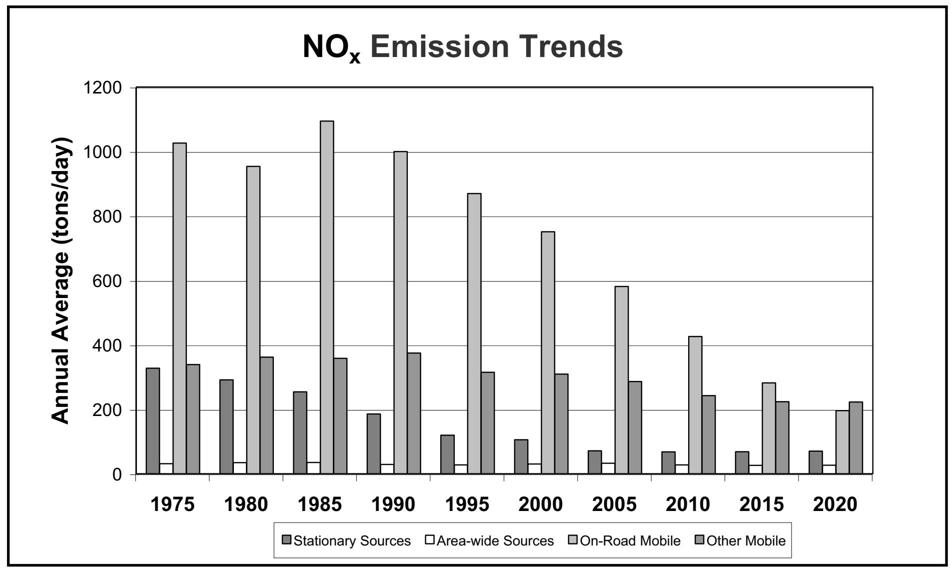

Figure 4-11

South Coast Air Basin

Nitrogen Dioxide Air Quality Trend

The South Coast Air Basin is one of only a few areas in California where nitrogen dioxide (NO_2) has been a problem. The South Coast Air Basin attained the State 1-hour NO_2 standard in 1994, bringing the entire State into attainment. The federal standard has not been exceeded since 1991.

Over the last 20 years, NO_2 values have decreased significantly in the South Coast Air Basin. The peak 1-hour indicator for 2003 was half of what it was during 1984. However, since the early 1990's, maximum 1-hour NO_2 concentrations that exceed the level of the State standard have occasionally occurred but have not affected the area's attainment status. These exceedances have been very infrequent and limited to either the Banning Airport or the Burbank-West Palm Avenue monitoring sites. Additional years of data will be needed to determine if there is any long-term change in NO_2 trends in the South Coast Air Basin.

Nitrogen dioxide is formed from emissions of oxides of nitrogen, which also contribute to ozone. As a result, the majority of the future emission control measures will be implemented as part of the overall ozone control strategy. Many of these control measures will target mobile sources, which account for more than three-quarters of California's oxides of nitrogen emissions.

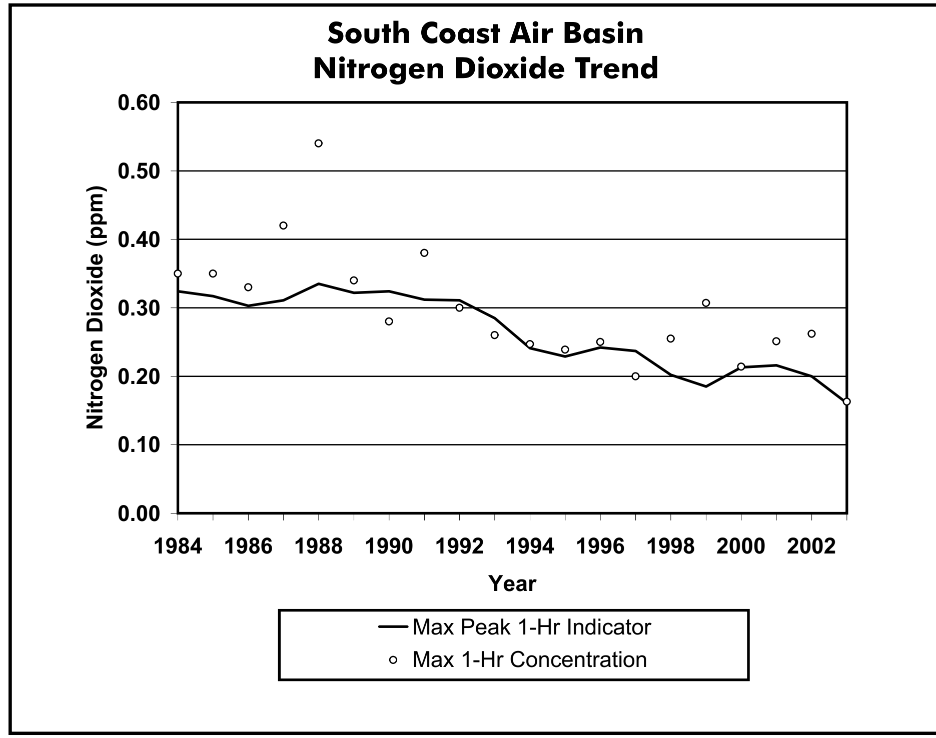

Figure 4-12

NITROGEN DIOXIDE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Peak 1-Hr. Indicator	0.324	0.317	0.303	0.311	0.335	0.322	0.324	0.312	0.311	0.285	0.241	0.229	0.242	0.237	0.202	0.185	0.213	0.216	0.200	0.161
Maximum 1-Hr. Concentration	0.350	0.350	0.330	0.420	0.540	0.340	0.280	0.380	0.300	0.260	0.247	0.239	0.250	0.200	0.255	0.307	0.214	0.251	0.262	0.163
Maximum Annual Average	0.057	0.060	0.061	0.055	0.061	0.057	0.055	0.055	0.051	0.050	0.050	0.046	0.042	0.043	0.043	0.051	0.044	0.041	0.040	0.035

Table 4-12

San Francisco Bay Area Air Basin

Introduction - Area Description

The San Francisco Bay Area is California's second largest metropolitan area and is the focal point of northern California. The nine county area comprises all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties, the southern half of Sonoma County, and the southwestern portion of Solano County. The unifying feature of the area is the Bay itself, which is oriented north-south and covers about 400 square miles of the area's total 5,340 square miles.

Over 19 percent of California's population resides in the San Francisco Bay Area, and pollution sources in the region account for about 16 percent of the total statewide criteria pollutant emissions. The climate in the San Francisco Bay Area varies from one location to the next. Along the coast, temperatures are mild year-round. However, as one moves inland, temperatures show larger diurnal and seasonal variations. Overall air quality in the San Francisco Bay Area Air Basin is better than in the South Coast Air Basin. This is due to a more favorable climate, with cooler temperatures and better ventilation. However, exceedances of the ozone standards continue to occur in the San Francisco Bay Area Air Basin, and still pose challenges to State and local air pollution control agencies.

Figure 4-13

San Francisco Bay Area Air Basin

Emission Trends and Forecasts

The emission levels for the ozone precursors NO_x and ROG have been trending downward in the San Francisco Bay Area Air Basin since 1975. CO emissions have also been trending downward since 1975. On-road motor vehicles are the largest contributors to CO, ROG, and NO_x emissions in the air basin. The implementation of stricter mobile source (both on-road and other) emission standards will continue to decrease vehicle emissions in this air basin. Controls on stationary source solvent evaporation and fugitive emissions will also continue to reduce ROG emissions.

San Francisco Bay Area Air Basin Emissions (tons/day, annual average)										
Pollutant	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
NO_X	975	968	905	876	741	632	535	446	363	316
ROG	1426	1360	1105	791	635	510	392	340	307	289
PM_{10}	168	169	182	181	170	184	191	193	196	200
$PM_{2.5}$	84	81	81	82	75	78	78	78	78	79
CO	8956	8293	7078	5241	3829	2793	2200	1766	1417	1205

Table 4-13

San Francisco Bay Area Air Basin

Population and VMT

Compared with the statewide totals, population and the number of vehicle miles traveled each day is projected to grow at a slower rate in the San Francisco Bay Area Air Basin from 1980 to 2020. During that 40-year period, the population is projected to increase about 57 percent, from about 5.1 million in 1980 to more than 8 million in 2020. During the same period, the daily VMT is projected to increase 136 percent, from 90 million miles per day in 1980 to over 213 million miles per day in 2020. While these growth rates are lower than the growth rates seen in other areas, they still represent substantial increases.

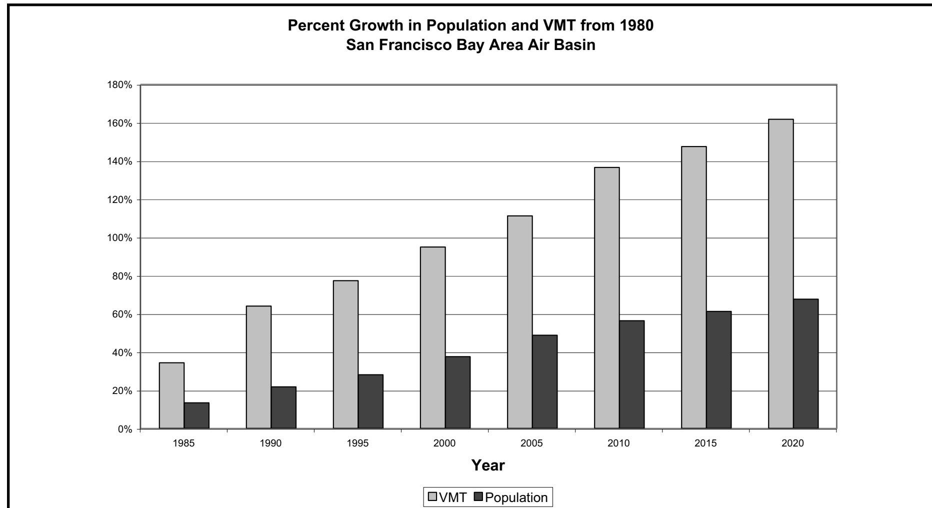

Figure 4-14

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population	5095400	5473900	5874400	6182500	6639400	7180000	7544800	7779600	8088700
Avg. Daily VMT(1000s)	90066	109789	133990	144854	159271	172581	193300	202212	213900

Table 4-14

San Francisco Bay Area Air Basin
Ozone Precursor Emission Trends and Forecasts

Emissions of ozone precursors have decreased in the San Francisco Bay Area Air Basin since 1975 and are projected to continue declining through 2020. The Bay Area has a significant motor vehicle population, and the implementation of stricter motor vehicle controls has resulted in significant emissions reductions for NO_x and ROG. Stationary source emissions of ROG have declined over the last 20 years due to new controls for oil refinery fugitive emissions and new rules for control of ROG from various industrial coatings and solvent operations.

NO_x Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***975***	***968***	***905***	***876***	***741***	***632***	***535***	***446***	***363***	***316***
Stationary Sources	231	208	137	132	103	83	67	70	74	77
Area-wide Sources	14	15	16	19	20	20	20	20	20	21
On-Road Mobile	552	570	566	524	437	352	286	217	146	101
Gasoline Vehicles	497	478	417	348	294	208	155	114	78	54
Diesel Vehicles	55	92	149	176	142	144	131	103	68	47
Other Mobile	178	175	186	201	182	177	163	139	123	117
Gasoline Fuel	8	8	9	11	12	13	13	10	10	10
Diesel Fuel	136	133	143	155	142	138	124	101	86	79
Other Fuel	33	33	34	35	28	26	27	27	28	29

Table 4-15

ROG Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***1426***	***1360***	***1105***	***791***	***635***	***510***	***392***	***340***	***307***	***289***
Stationary Sources	311	299	209	125	119	117	88	89	92	95
Area-wide Sources	149	142	133	133	101	94	88	87	89	90
On-Road Mobile	873	822	658	421	309	208	152	113	81	62
Gasoline Vehicles	869	816	649	413	303	202	146	108	77	58
Diesel Vehicles	3	6	9	8	6	6	6	5	4	3
Other Mobile	94	96	104	112	105	92	64	50	45	43
Gasoline Fuel	69	71	77	83	82	71	44	33	29	27
Diesel Fuel	13	12	13	15	14	14	12	9	7	6
Other Fuel	12	13	13	14	9	7	8	8	9	9

Table 4-16

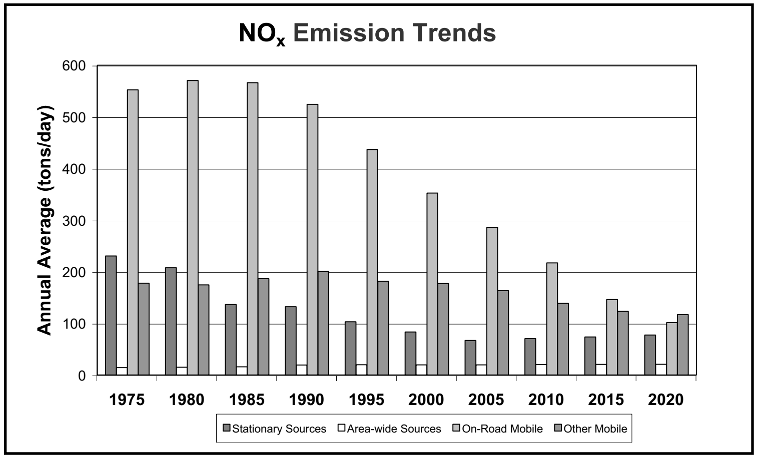

Figure 4-15

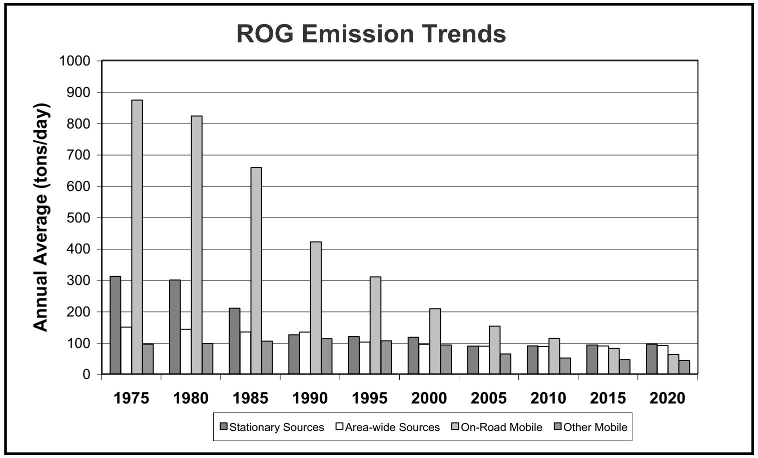

Figure 4-16

San Francisco Bay Area Air Basin

Ozone Air Quality Trend

Ozone concentrations in the San Francisco Bay Area are much lower than in the South Coast and San Joaquin Air Basins. The peak 1-hour and 8-hour indicators have declined by 21 percent during the last 20 years. The number of days when State and federal standards are exceeded also show a similar trend. Another measure of progress is that the Bay Area now qualifies for attainment of the federal 1-hour ozone standard, although they still exceed the more stringent State 1-hour and federal 8-hour standards. Although the long-term trends indicate improving air quality, since 1994 the peak indicators have been somewhat elevated. However, it is not yet clear whether these data represent a significant change in the overall trend.

Meteorology can cause ozone and ozone precursor emissions to be transported from one air basin to another. The ARB has identified the San Francisco Bay Area Air Basin as a transport contributor to the following six areas: the Sacramento region, the Mountain Counties Air Basin, the North Central Coast Air Basin, the North Coast Air Basin, the San Joaquin Valley Air Basin, and the South Central Coast Air Basin. The amount of transport impact varies from day to day, depending in large part on meteorology. To the extent that the Bay Area continues to reduce ozone precursor emissions, the transport impact on downwind areas should also decrease.

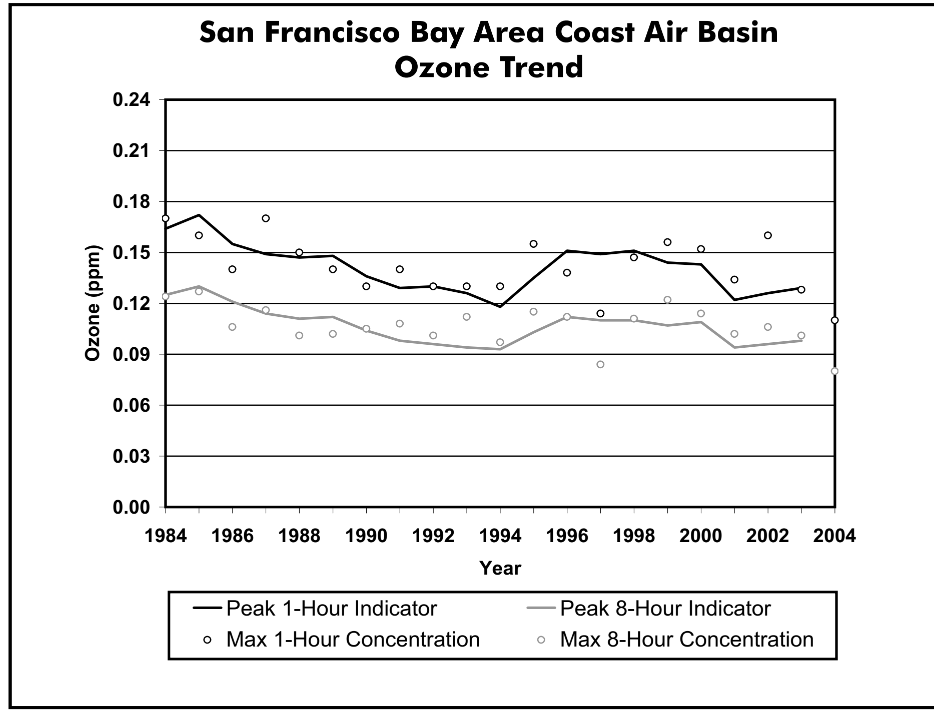

Figure 4-17

OZONE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004[1]
Peak 1-Hour Indicator	0.164	0.172	0.155	0.149	0.147	0.148	0.136	0.129	0.130	0.126	0.118	0.135	0.151	0.149	0.151	0.144	0.143	0.122	0.126	0.129	
Peak 8-Hour Indicator	0.125	0.130	0.121	0.114	0.111	0.112	0.104	0.098	0.096	0.094	0.093	0.103	0.112	0.110	0.110	0.107	0.109	0.094	0.096	0.098	
4th High 1-Hr. in 3 Yrs	0.160	0.160	0.150	0.140	0.140	0.140	0.130	0.130	0.120	0.120	0.121	0.138	0.138	0.138	0.138	0.139	0.139	0.126	0.124	0.123	
Avg. of 4th High 8-Hr. in 3 Yrs	0.100	0.103	0.097	0.092	0.092	0.097	0.088	0.084	0.082	0.081	0.082	0.087	0.093	0.090	0.089	0.086	0.087	0.082	0.082	0.086	
Maximum 1-Hr. Concentration	0.170	0.160	0.140	0.170	0.150	0.140	0.130	0.140	0.130	0.130	0.130	0.155	0.138	0.114	0.147	0.156	0.152	0.134	0.160	0.128	0.110
Maximum 8-Hr. Concentration	0.124	0.127	0.106	0.116	0.101	0.102	0.105	0.108	0.101	0.112	0.097	0.115	0.112	0.084	0.111	0.122	0.114	0.102	0.106	0.101	0.080
Days Above State Standard	55	45	39	46	41	22	14	23	23	19	13	28	34	8	29	20	12	15	16	19	7
Days Above Nat. 1-Hr. Std.	22	9	5	14	5	4	2	2	2	3	2	11	8	0	8	3	3	1	2	1	0
Days Above Nat. 8-Hr. Std.	32	17	13	29	20	13	7	6	6	5	4	18	14	0	16	9	4	7	7	7	0

[1] Preliminary data for January through October 2004 are shown here, however they are subject to change. 2003 is the last year for which complete and approved data is available, thus annual statistics are not included.

Table 4-17

San Francisco Bay Area Air Basin
Directly Emitted PM_{10} Emission Trends and Forecasts

Direct emissions of PM_{10} increased in the San Francisco Bay Area Air Basin between 1975 and 2000 and are projected to continue increasing through 2020. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust sources. Emissions of directly emitted PM_{10} from diesel motor vehicles have been decreasing since 1990 even though population and VMT are growing, due to adoption of more stringent emission standards.

Particulate matter can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia (secondary PM). The PM_{10} emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM_{10} emissions contribute approximately 75 percent of the ambient PM_{10} in the San Francisco Bay Area Air Basin.

Directly Emitted PM_{10} Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***168***	***169***	***182***	***181***	***170***	***184***	***191***	***193***	***196***	***200***
Stationary Sources	36	24	21	17	18	18	16	17	17	18
Area-wide Sources	114	124	137	138	131	145	153	156	159	162
On-Road Mobile	7	9	12	12	9	9	10	10	10	11
Gasoline Vehicles	5	4	4	5	5	6	7	8	9	9
Diesel Vehicles	2	5	7	7	4	3	3	2	2	1
Other Mobile	12	12	12	14	11	11	11	10	10	9
Gasoline Fuel	1	1	1	1	2	2	2	2	3	3
Diesel Fuel	10	9	10	11	9	9	8	7	6	5
Other Fuel	1	1	2	2	1	1	1	1	1	1

Table 4-18

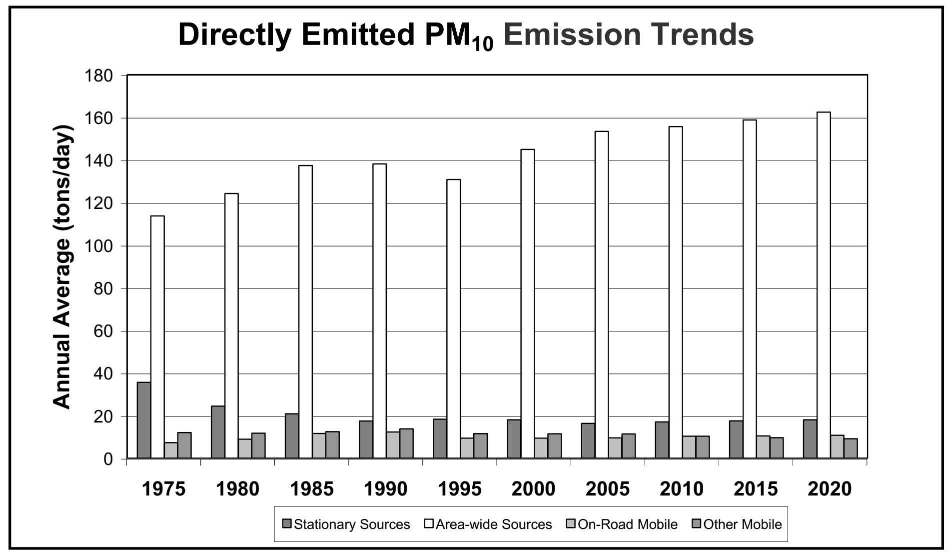

Figure 4-18

San Francisco Bay Area Air Basin

Directly Emitted $PM_{2.5}$ Emission Trends and Forecasts

Direct emissions of $PM_{2.5}$ declined slightly in the San Francisco Bay Area Air Basin between 1975 and 2000 and are projected to remain constant through 2020. Emissions from stationary sources declined slightly, while area-wide sources increased. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust sources. Emissions of directly emitted $PM_{2.5}$ from diesel motor vehicles have been decreasing since 1990 even though population and VMT are growing, due to adoption of more stringent emission standards.

Particulate matter can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia (secondary PM). The $PM_{2.5}$ emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted $PM_{2.5}$ emissions contribute approximately 60 percent of the ambient $PM_{2.5}$ in the San Francisco Bay Area Air Basin.

Directly Emitted $PM_{2.5}$ Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***84***	***81***	***81***	***82***	***75***	***78***	***78***	***78***	***78***	***79***
Stationary Sources	26	20	14	12	14	14	13	13	13	14
Area-wide Sources	41	44	46	48	44	47	49	49	49	50
On-Road Mobile	5	7	9	9	7	6	7	7	7	7
Gasoline Vehicles	3	3	2	3	3	3	4	5	5	6
Diesel Vehicles	2	4	7	7	4	3	3	2	2	1
Other Mobile	11	11	11	13	10	10	10	9	8	8
Gasoline Fuel	1	1	1	1	1	1	2	2	2	2
Diesel Fuel	9	8	9	10	8	8	8	6	5	5
Other Fuel	1	1	2	2	1	1	1	1	1	1

Table 4-19

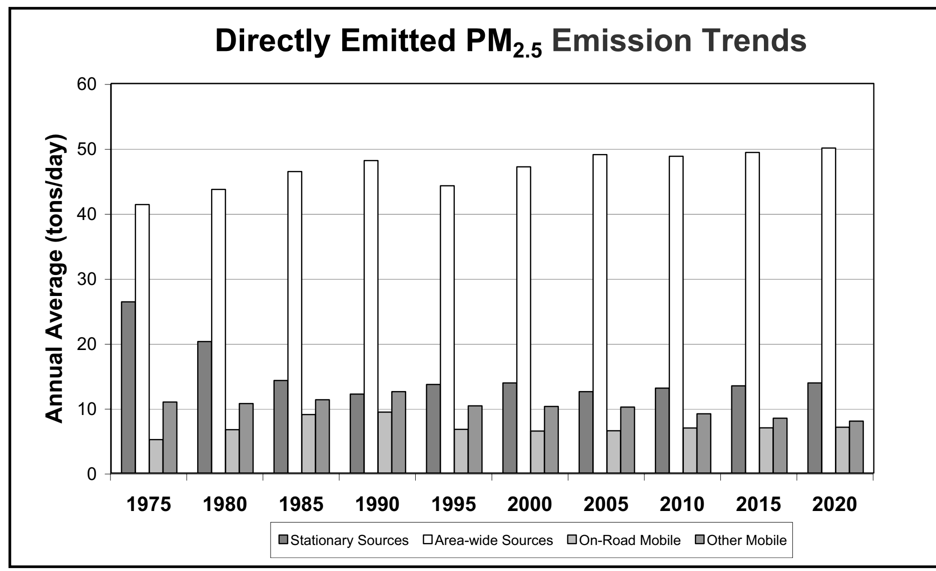

Figure 4-19

San Francisco Bay Area Air Basin

PM_{10} Air Quality Trend

As with other pollutants, the PM_{10} statistics also show overall improvement. During the period for which data are available, the three year average of the annual average of quarters (State) decreased about 32 percent.

Calculated exceedance days for the State 24-hour standard dropped from a high of 123 days during 1988 to 30 days during 2003. The national 24-hour standard was last exceeded in 1991. Because many of the same sources contribute to both ozone and PM_{10}, future ozone precursor emission controls should help ensure continued PM_{10} improvements.

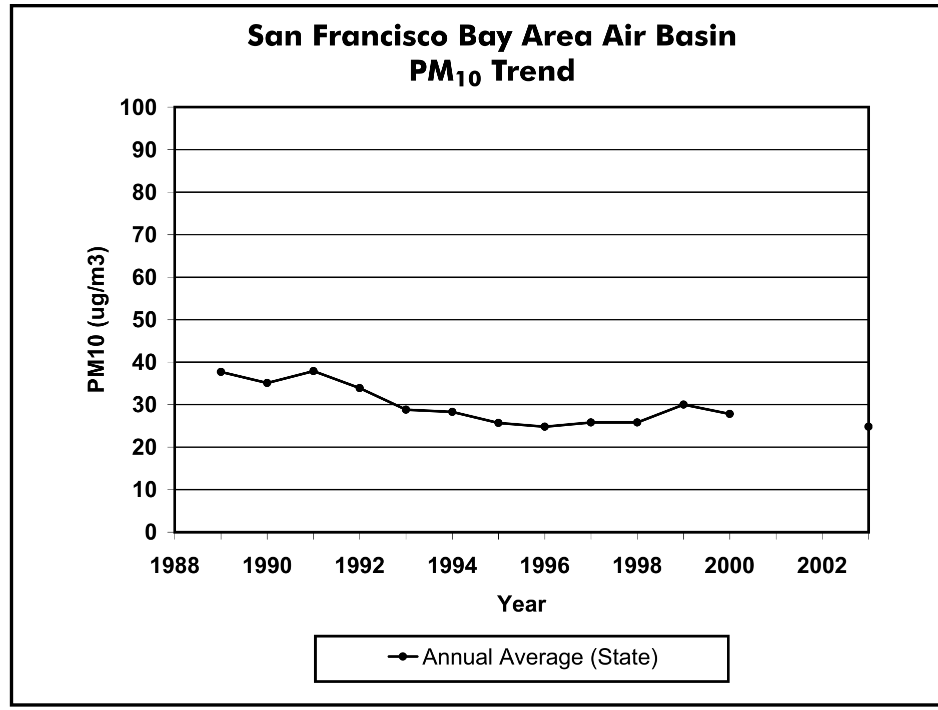

Figure 4-20

PM10 (ug/m3)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Maximum 24-Hr. Concentration (State)					146	147	165	155	112	93	97	74	76	85	100	117	80	114	84	60
Maximum 24-Hr. Concentration (Nat)					146	150	173	155	112	101	97	74	76	95	92	114	76	109	80	58
Annual Average (State)						37.7	35.1	37.9	33.9	28.8	28.3	25.7	24.8	25.8	25.8	30.0	27.8			24.8
Annual Average (Nat)					38.3	40.8	40.4	38.3	33.7	28.8	28.3	25.7	24.9	25.8	25.1	28.7	26.8	28.9	25.4	24.2
Calc Days Above State 24-Hr Std					123	137	93	125	108	59	54	42	18	20	25	63	42	51	30	30
Calc Days Above Nat 24-Hr Std					0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0

Table 4-20

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San Francisco Bay Area Air Basin
Carbon Monoxide Emission Trends and Forecasts

Emissions of CO have been declining in the San Francisco Bay Area Air Basin since 1975. Motor vehicles and other mobile sources are the largest sources of CO emissions in the air basin. Emissions from motor vehicles have been declining, with the introduction of new automotive emission controls, despite increases in VMT. Oil refineries, manufacturing, and electric generation contribute a significant portion of the stationary source CO emissions. Area-wide CO emissions are primarily from residential fuel combustion (including wood), waste burning, and fires.

CO Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***8956***	***8293***	***7078***	***5241***	***3829***	***2793***	***2200***	***1766***	***1417***	***1205***
Stationary Sources	49	58	76	69	60	50	44	47	49	51
Area-wide Sources	173	175	176	174	164	170	175	171	170	169
On-Road Mobile	8155	7477	6190	4310	2965	2029	1496	1105	752	522
Gasoline Vehicles	8142	7454	6152	4270	2934	2001	1470	1082	733	505
Diesel Vehicles	13	23	38	39	31	27	26	23	19	17
Other Mobile	580	583	636	688	640	545	484	442	446	462
Gasoline Fuel	448	457	500	548	517	434	375	332	332	344
Diesel Fuel	54	54	61	67	61	53	47	44	44	45
Other Fuel	78	72	75	73	62	58	62	66	71	74

Table 4-21

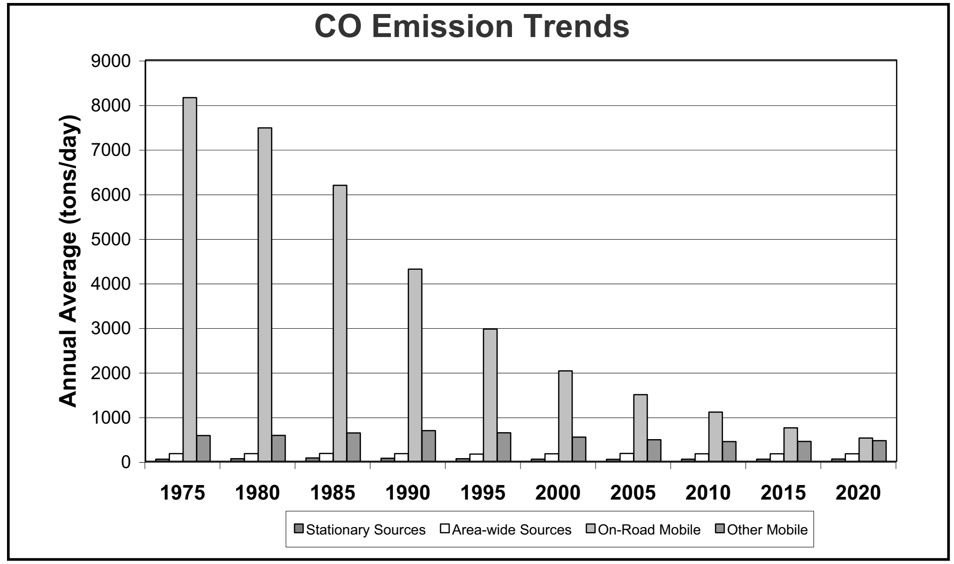

Figure 4-21

San Francisco Bay Area Air Basin

Carbon Monoxide Air Quality Trend

As in other areas of the State, carbon monoxide concentrations in the San Francisco Bay Area Air Basin have declined substantially over the last 20 years. The peak 8-hour indicator value during 2003 is less than half of what it was during 1984 and is now well below the level of the standards. In fact, neither the State nor the national standards have been exceeded in this area since 1991.

Much of the decline in ambient carbon monoxide concentrations can be attributed to the introduction of clean fuels and newer, cleaner motor vehicles. The San Francisco Bay Area Air Basin is currently designated as attainment for both the State and national CO standards. Based on emission projections, the area is expected to maintain its attainment status in the coming years.

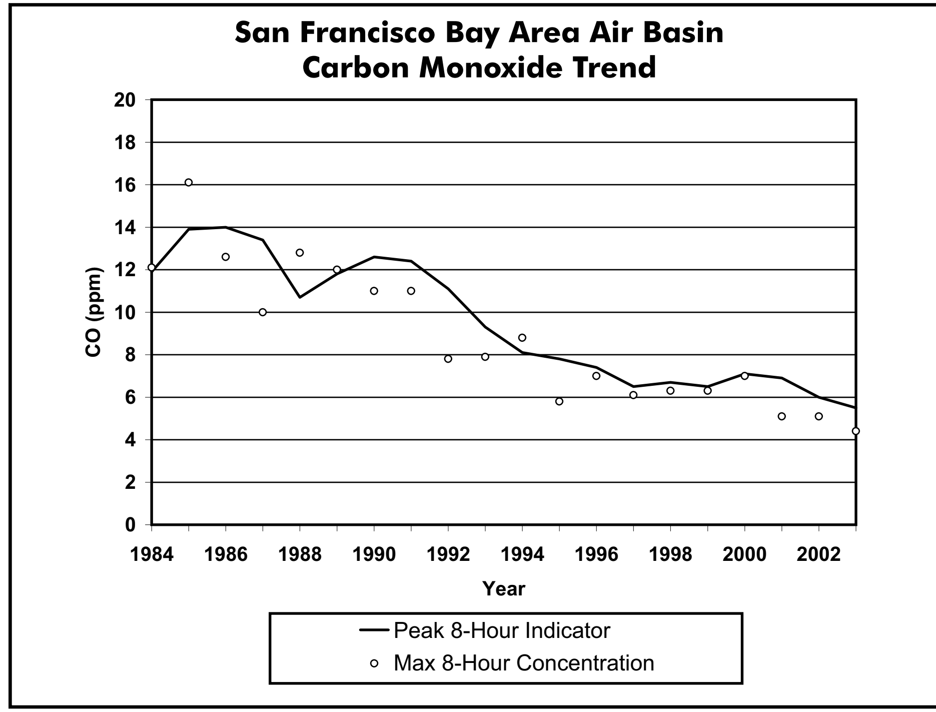

Figure 4-22

CARBON MONOXIDE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Peak 8-Hr. Indicator	11.9	13.9	14.0	13.4	10.7	11.8	12.6	12.4	11.1	9.3	8.1	7.8	7.4	6.5	6.7	6.5	7.1	6.9	6.0	5.5
Maximum 1-Hr. Concentration	20.0	21.0	20.0	17.0	15.0	19.0	18.0	15.0	12.0	14.0	12.0	10.1	8.8	10.7	8.7	9.0	9.8	7.6	7.7	8.6
Maximum 8-Hr. Concentration	12.1	16.1	12.6	10.0	12.8	12.0	11.0	11.0	7.8	7.9	8.8	5.8	7.0	6.1	6.3	6.3	7.0	5.1	5.1	4.4
Days Above State 8-Hr. Std.	8	24	8	2	4	10	4	5	0	0	0	0	0	0	0	0	0	0	0	0
Days Above Nat. 8-Hr. Std.	7	21	8	1	4	9	2	4	0	0	0	0	0	0	0	0	0	0	0	0

Table 4-22

San Francisco Bay Area Air Basin

Nitrogen Dioxide

Oxides of Nitrogen Emission Trends and Forecasts

Emissions of NO_x and NO_2 have decreased in the San Francisco Bay Area Air Basin since 1975 and are projected to continue declining through 2020. The Bay Area has a significant motor vehicle population, and the implementation of stricter motor vehicle controls has resulted in significant emissions reductions for NO_x.

NO_x Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***975***	***968***	***905***	***876***	***741***	***632***	***535***	***446***	***363***	***316***
Stationary Sources	231	208	137	132	103	83	67	70	74	77
Area-wide Sources	14	15	16	19	20	20	20	20	20	21
On-Road Mobile	552	570	566	524	437	352	286	217	146	101
Gasoline Vehicles	497	478	417	348	294	208	155	114	78	54
Diesel Vehicles	55	92	149	176	142	144	131	103	68	47
Other Mobile	178	175	186	201	182	177	163	139	123	117
Gasoline Fuel	8	8	9	11	12	13	13	10	10	10
Diesel Fuel	136	133	143	155	142	138	124	101	86	79
Other Fuel	33	33	34	35	28	26	27	27	28	29

Table 4-23

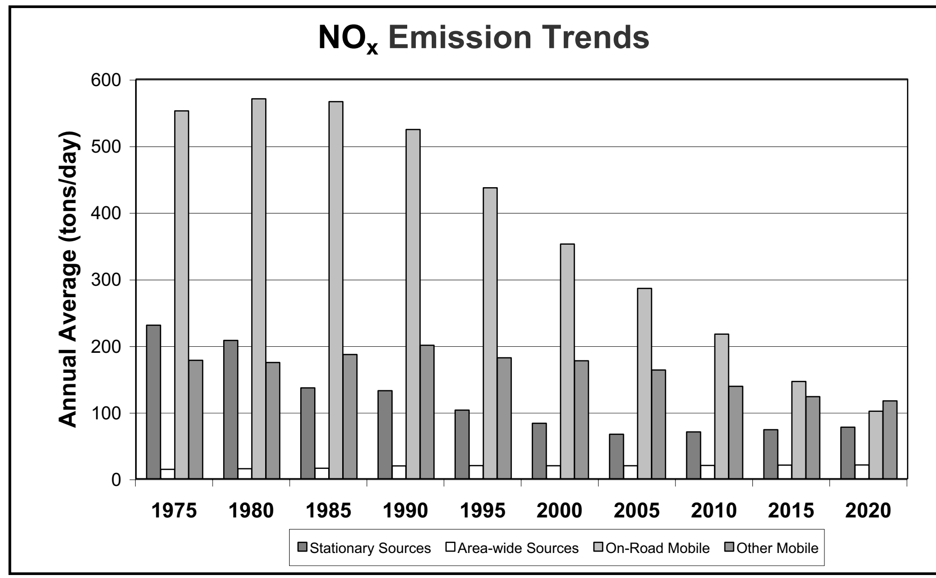

Figure 4-23

San Francisco Bay Area Air Basin

Nitrogen Dioxide Air Quality Trend

The San Francisco Bay Area has attained both the State and national nitrogen dioxide standards for more than twenty years. During this time-period, there have been no concentrations that exceeded the level of the State 1-hour or the national annual standard. Ambient concentrations continue to be well below the level of both standards. The peak 1-hour indicator has declined by almost 60 percent in the San Francisco Bay Area since 1984. This downward trend is expected to continue.

Nitrogen dioxide is formed from emissions of oxides of nitrogen, which also contribute to ozone. As a result, the majority of the future emission control measures will be implemented as part of the overall ozone control strategy. Many of these control measures will target mobile sources, which account for more than three-quarters of California's oxides of nitrogen emissions.

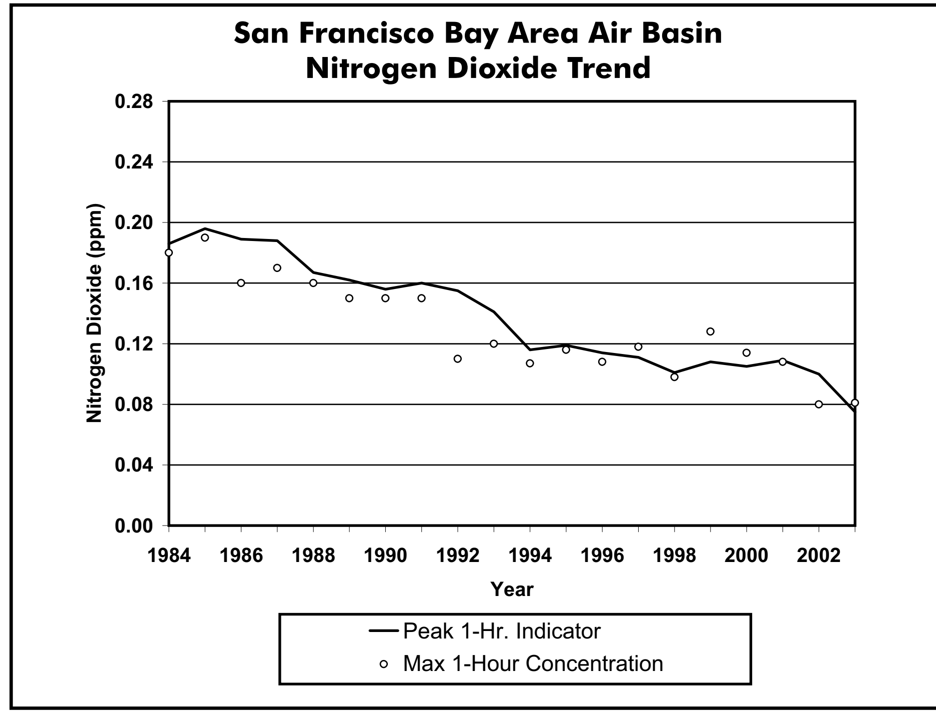

Figure 4-24

NITROGEN DIOXIDE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Peak 1-Hr. Indicator	0.186	0.196	0.189	0.188	0.167	0.162	0.156	0.160	0.155	0.141	0.116	0.119	0.114	0.111	0.101	0.108	0.105	0.109	0.100	0.075
Maximum 1-Hr. Concentration	0.180	0.190	0.160	0.170	0.160	0.150	0.150	0.150	0.110	0.120	0.107	0.116	0.108	0.118	0.098	0.128	0.114	0.108	0.080	0.081
Maximum Annual Average	0.032	0.035	0.033	0.031	0.032	0.032	0.030	0.031	0.027	0.027	0.028	0.027	0.025	0.025	0.025	0.026	0.025	0.024	0.019	0.018

Table 4-24

San Joaquin Valley Air Basin

Introduction - Area Description

The San Joaquin Valley Air Basin occupies the southern two-thirds of California's Central Valley. The eight-county area comprises Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties and the western portion of Kern County. The Valley covers nearly 23,490 square miles. With very few exceptions, the San Joaquin Valley is flat and unbroken, with most of the area lying below 400 feet in elevation. The Valley floor slopes downward from east to west, and the San Joaquin River winds its way along the western side from south to north.

Similar to other inland areas, the San Joaquin Valley has cool wet winters and hot dry summers. Generally, the temperature increases and rainfall decreases from north to south.

In contrast to other California areas, air quality in the San Joaquin Valley is not dominated by emissions from one large urban area. Instead, there are a number of moderately sized urban areas spread along the main axis of the Valley. This wide distribution of emissions complicates the challenge faced by air quality control agencies. Overall, about 10 percent of California's population lives in the San Joaquin Valley, and pollution sources in the region account for about 14 percent of the total statewide criteria pollutant emissions.

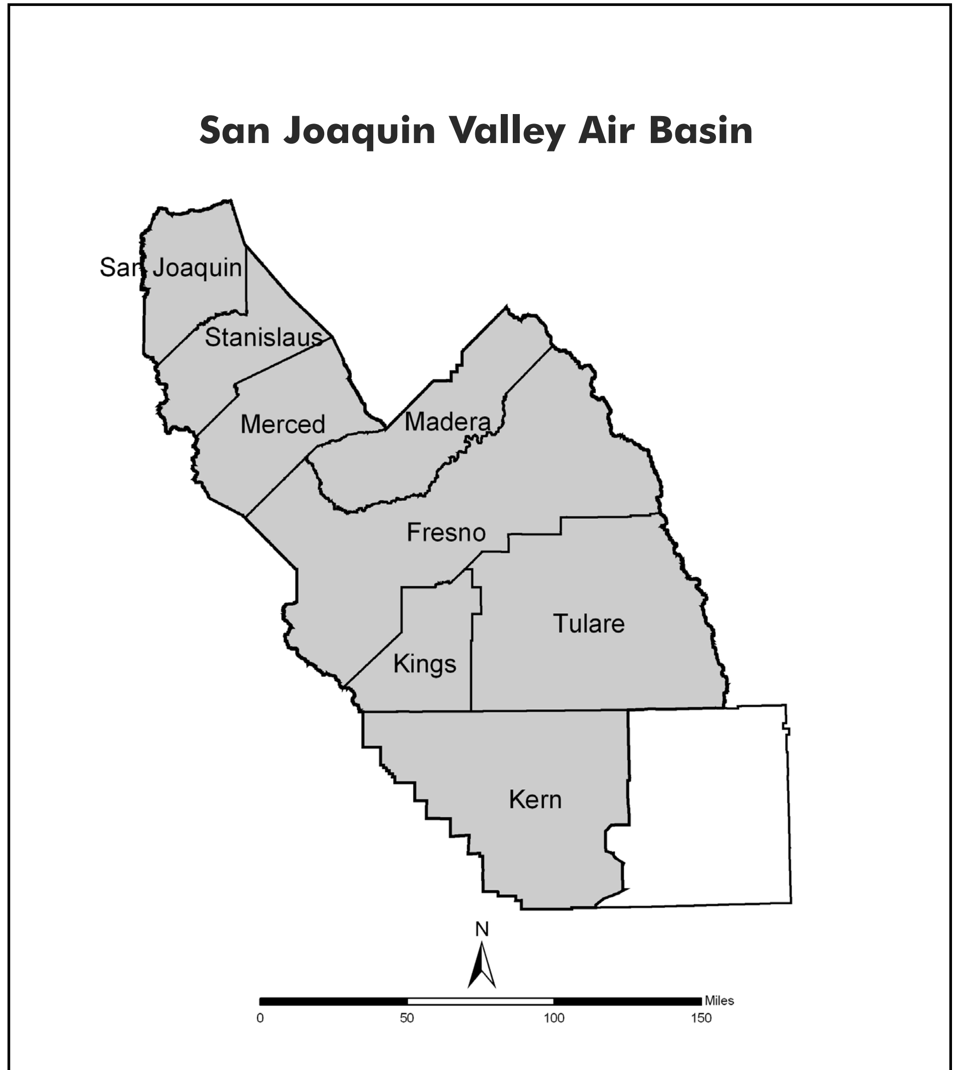

Figure 4-25

San Joaquin Valley Air Basin

Emission Trends and Forecasts

With the exception of PM_{10}, the emission levels in the San Joaquin Valley Air Basin have been decreasing since 1990. The decreases are predominantly due to motor vehicle controls and reductions in evaporative and fugitive emissions. On-road motor vehicles are the largest contributors to CO emissions in the San Joaquin Valley. On-road motor vehicles, other mobile sources, and stationary sources are all significant contributors to NO_x emissions. A significant portion of the stationary source ROG emissions is fugitive emissions from the extensive oil and gas production operations in the lower San Joaquin Valley. PM_{10} emissions are mostly fugitive dust from paved and unpaved roads, agricultural operations, and waste burning.

San Joaquin Valley Air Basin Emissions (tons/day, annual average)										
Pollutant	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
NO_X	677	842	842	811	686	568	479	400	335	294
ROG	1176	1235	1060	642	506	441	386	364	357	360
PM_{10}	352	342	343	351	345	352	358	375	385	397
$PM_{2.5}$	163	155	150	149	145	148	149	153	157	161
CO	3852	3879	3659	3336	2617	2076	1670	1384	1187	1073

Table 4-25

San Joaquin Valley Air Basin

Population and VMT

Compared to California's other urban areas, the population and number of vehicle miles traveled each day in the San Joaquin Valley Air Basin is projected to grow at a much faster rate during the 1980 to 2020 time period. The population is projected to increase about 150 percent, from nearly 2 million in 1980 to nearly 5 million in 2020. During the same period, the daily VMT is projected to increase by 312 percent, from nearly 33 million miles per day in 1980 to over 135 million miles per day in 2020. These growth rates are so much higher than the growth rates in other areas.

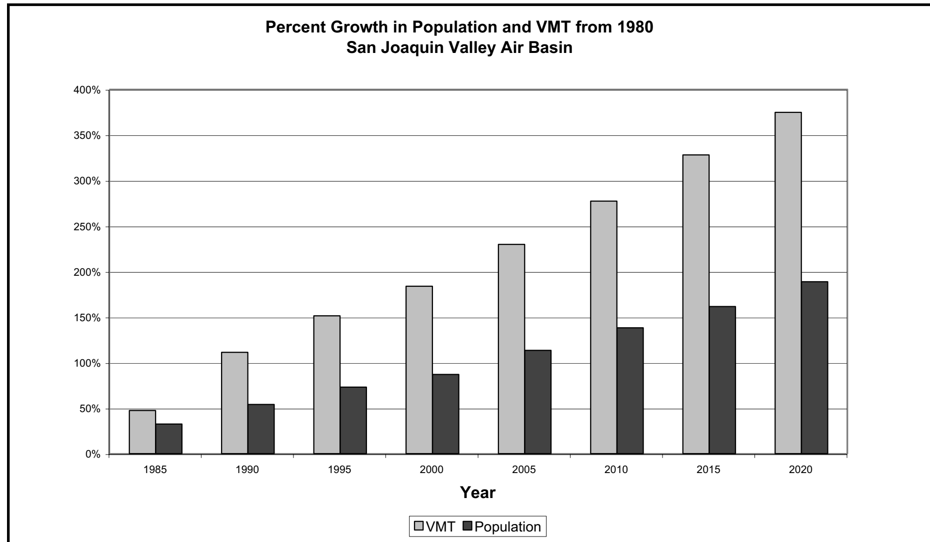

Figure 4-26

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population	1979800	2275800	2645200	2972600	3210800	3666300	4090900	4492900	4959900
Avg. Daily VMT(1000s)	32884	42075	60357	71772	81055	94209	107741	122270	135618

Table 4-26

San Joaquin Valley Air Basin
Ozone Precursor Emission Trends and Forecasts

Emissions of the ozone precursors NO_x and ROG are decreasing in the San Joaquin Valley Air Basin. Both stationary source and motor vehicle NO_x emissions have been reduced by the adoption of more stringent emission standards. Stricter standards have reduced ROG emissions from motor vehicles since 1980, even though VMT have been increasing. Stationary and area-wide sources of ROG include petroleum production operations and the use of solvents. Stricter emission standards and new controls have reduced the ROG emissions from these sources. Also, declining crude oil prices have resulted in cutbacks in oil production activities and an attendant decrease in ROG fugitive emissions. Future increases in oil prices could result in higher levels of production, which could again increase emissions.

NO_x Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***677***	***842***	***842***	***811***	***686***	***568***	***479***	***400***	***335***	***294***
Stationary Sources	265	354	353	289	220	161	139	136	138	139
Area-wide Sources	13	13	13	12	12	11	11	11	11	11
On-Road Mobile	219	252	292	320	288	239	196	145	98	68
Gasoline Vehicles	169	171	168	174	161	121	83	58	40	29
Diesel Vehicles	50	81	124	145	127	118	113	87	57	39
Other Mobile	180	223	184	191	167	157	133	108	88	76
Gasoline Fuel	4	5	5	6	6	6	7	7	6	6
Diesel Fuel	168	210	174	181	157	145	121	97	77	65
Other Fuel	8	8	5	5	5	5	5	5	5	5

Table 4-27

ROG Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***1176***	***1235***	***1060***	***642***	***506***	***441***	***386***	***364***	***357***	***360***
Stationary Sources	690	740	580	197	103	98	88	91	95	98
Area-wide Sources	134	141	148	154	161	158	161	168	178	188
On-Road Mobile	292	286	268	224	174	119	84	59	43	34
Gasoline Vehicles	289	281	260	216	168	114	79	55	40	31
Diesel Vehicles	3	5	8	8	6	5	5	5	4	3
Other Mobile	60	68	64	68	68	65	52	46	42	40
Gasoline Fuel	23	30	35	39	42	40	28	23	21	20
Diesel Fuel	16	21	16	17	16	14	12	9	7	5
Other Fuel	20	17	13	11	10	11	12	13	14	14

Table 4-28

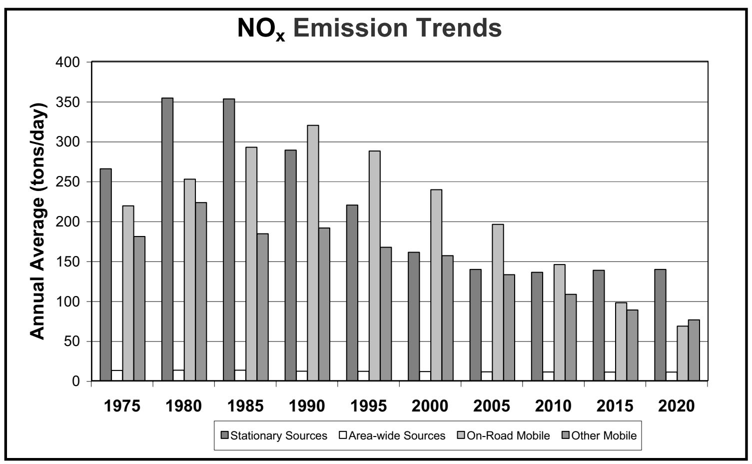

Figure 4-27

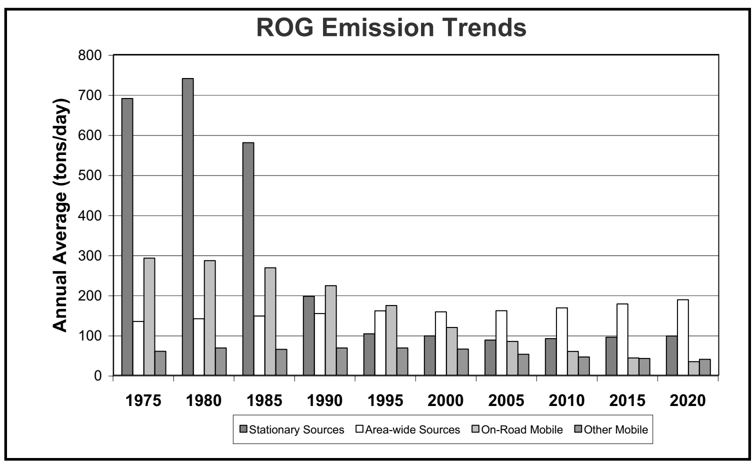

Figure 4-28

San Joaquin Valley Air Basin

Ozone Air Quality Trend

The ozone problem in the San Joaquin Valley ranks among the most severe in the State. Peak levels have not declined as much as the number of days that standards are exceeded. From 1984 to 2003, the maximum peak 1-hour indicator decreased only eight percent. The number of national 1-hour standard exceedance days has been quite variable over the years. This variability is due, in part, to the influence of meteorology as well as changes to the monitoring network. The monitoring network was not as extensive during the 1980's as it has been during the last 14 years. For this reason, the period between 1990 to 2004 provides a better indication of trends. During this period, there has been a 55 percent decrease in the three year average of the number of exceedance days of the national 1-hour standard.

The ARB has identified the San Joaquin Valley Air Basin as both a contributor and a receptor for ozone transport. The Valley is a transport contributor to the Sacramento region, the Great Basin Valleys Air Basin, the Mountain Counties Air Basin, the Mojave Desert Air Basin, the North Central Coast Air Basin, and the South Central Coast Air Basin. In contrast, the San Joaquin Valley Air Basin is a receptor area for ozone transported from the Broader Sacramento Area and the San Francisco Bay Area Air Basin.

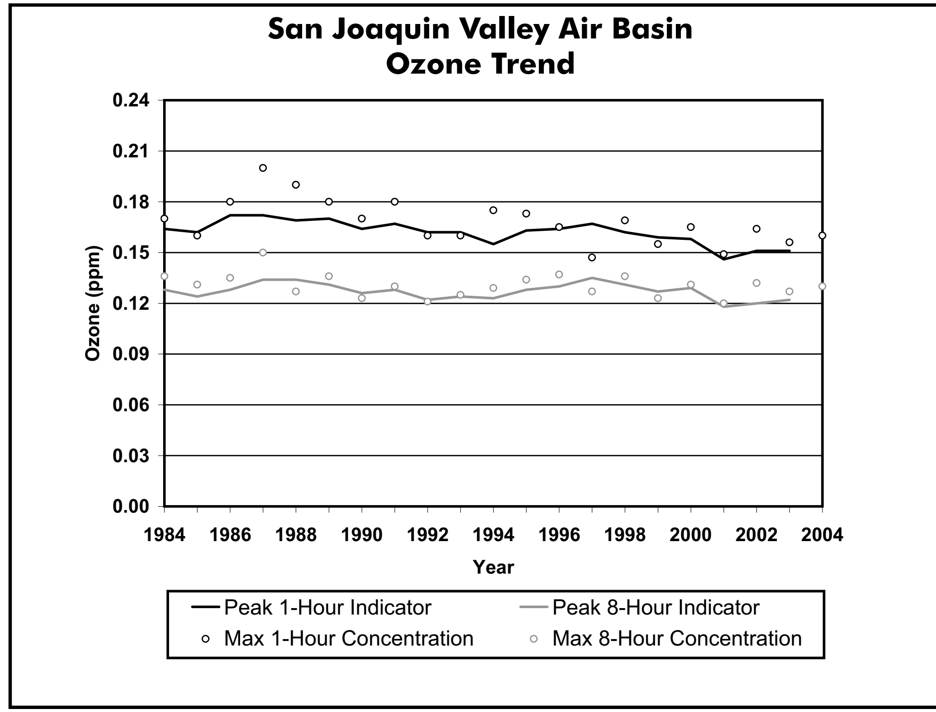

Figure 4-29

OZONE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004[1]
Peak 1-Hour Indicator	0.164	0.162	0.172	0.172	0.169	0.170	0.164	0.167	0.162	0.162	0.155	0.163	0.164	0.167	0.162	0.159	0.158	0.146	0.151	0.151	
Peak 8-Hour Indicator	0.128	0.124	0.128	0.134	0.134	0.131	0.126	0.128	0.122	0.124	0.123	0.128	0.130	0.135	0.131	0.127	0.129	0.118	0.120	0.122	
4th High 1-Hr. in 3 Yrs	0.160	0.160	0.170	0.170	0.170	0.170	0.160	0.160	0.160	0.160	0.160	0.165	0.165	0.164	0.161	0.161	0.161	0.146	0.151	0.151	
Avg. of 4th High 8-Hr. in 3 Yrs	0.114	0.111	0.117	0.118	0.121	0.120	0.119	0.118	0.115	0.112	0.111	0.119	0.119	0.115	0.115	0.113	0.111	0.109	0.115	0.115	
Maximum 1-Hr. Concentration	0.170	0.160	0.180	0.200	0.190	0.180	0.170	0.180	0.160	0.160	0.175	0.173	0.165	0.147	0.169	0.155	0.165	0.149	0.164	0.156	0.160
Maximum 8-Hr. Concentration	0.136	0.131	0.135	0.150	0.127	0.136	0.123	0.130	0.121	0.125	0.129	0.134	0.137	0.127	0.136	0.123	0.131	0.120	0.132	0.127	0.130
Days Above State Standard	135	149	147	156	156	148	131	133	127	125	118	124	120	110	90	123	114	123	127	137	105
Days Above Nat. 1-Hr. Std.	61	53	59	65	74	54	45	51	29	43	43	44	56	16	39	28	30	32	31	37	9
Days Above Nat. 8-Hr. Std.	120	127	134	148	140	133	104	121	119	104	108	109	114	95	84	117	103	109	125	134	104

[1] Preliminary data for January through October 2004 are shown here, however they are subject to change. 2003 is the last year for which complete and approved data is available, thus annual statistics are not included.

Table 4-29

San Joaquin Valley Air Basin
Directly Emitted PM_{10} Emission Trends and Forecasts

Direct emissions of PM_{10} have remained unchanged between 1975 and 2000 and are projected to increase through 2020. PM_{10} emissions in the San Joaquin Valley are dominated by emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, waste burning, and residential fuel combustion (including wood).

Particulate matter can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia (secondary PM). The PM_{10} emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM_{10} emissions contribute approximately 75 percent of the ambient PM_{10} in the San Joaquin Valley Air Basin.

Directly Emitted PM_{10} Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***352***	***342***	***343***	***351***	***345***	***352***	***358***	***375***	***385***	***397***
Stationary Sources	58	42	35	28	27	28	24	25	26	28
Area-wide Sources	278	279	289	301	301	309	319	336	346	357
On-Road Mobile	4	6	8	9	7	6	6	6	6	7
Gasoline Vehicles	2	2	2	2	3	3	4	4	5	6
Diesel Vehicles	2	4	6	6	4	3	3	2	2	1
Other Mobile	12	15	12	13	10	10	9	8	7	6
Gasoline Fuel	0	1	1	1	1	1	1	1	2	2
Diesel Fuel	11	14	11	12	9	8	7	6	5	4
Other Fuel	1	1	0	1	0	0	0	0	0	0

Table 4-30

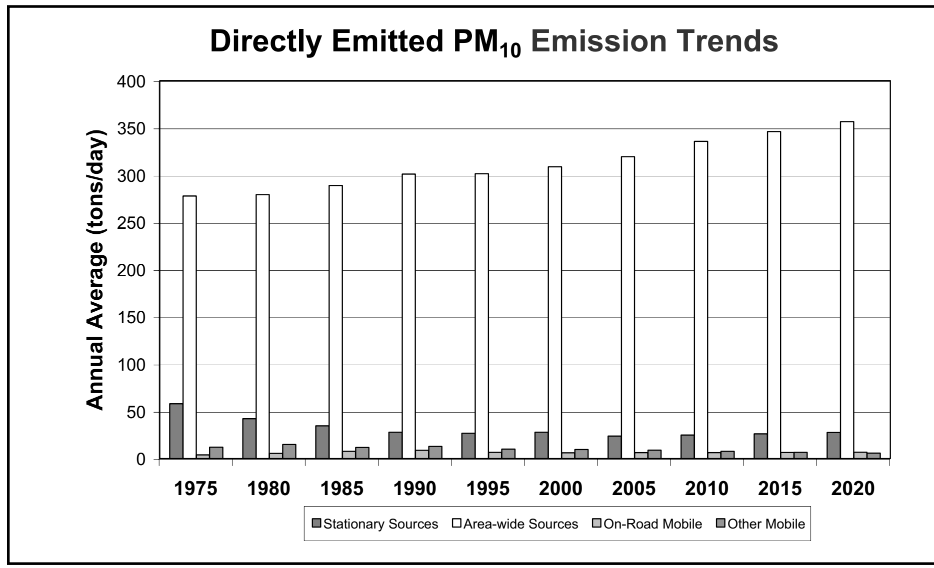

Figure 4-30

San Joaquin Valley Air Basin
Directly Emitted $PM_{2.5}$ Emission Trends and Forecasts

Direct emissions of $PM_{2.5}$ decreased from 1975 to 2000 but are projected to increase through 2020. $PM_{2.5}$ emissions in the San Joaquin Valley are dominated by emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, waste burning, and residential fuel combustion (including wood).

Particulate matter can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia (secondary PM). The $PM_{2.5}$ emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted $PM_{2.5}$ emissions contribute approximately 60 percent of the ambient $PM_{2.5}$ in the San Joaquin Valley Air Basin.

Directly Emitted $PM_{2.5}$ Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***163***	***155***	***150***	***149***	***145***	***148***	***149***	***153***	***157***	***161***
Stationary Sources	47	33	25	19	18	19	17	18	18	19
Area-wide Sources	102	104	108	112	113	116	119	124	128	132
On-Road Mobile	3	5	6	7	5	4	4	4	4	4
Gasoline Vehicles	1	1	1	1	2	2	2	2	3	3
Diesel Vehicles	2	4	6	6	4	3	2	2	1	1
Other Mobile	11	14	11	12	9	9	8	7	6	5
Gasoline Fuel	0	0	0	1	1	1	1	1	1	1
Diesel Fuel	10	13	10	11	8	7	7	5	4	3
Other Fuel	1	1	0	1	0	0	0	0	0	0

Table 4-31

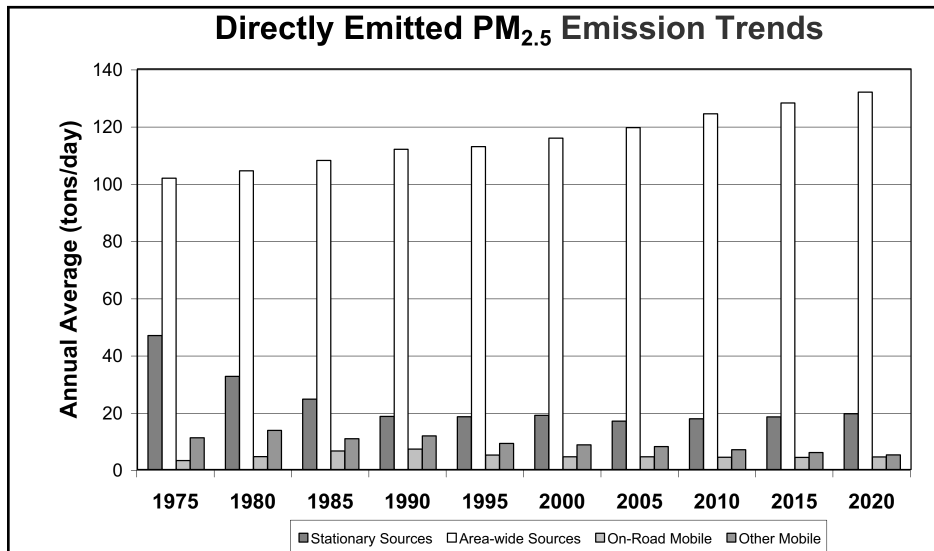

Figure 4-31

San Joaquin Valley Air Basin

PM_{10} Air Quality Trend

The available PM_{10} data show some variation during the trend period, but overall, there has been a downward trend. Part of the variation can be attributed to meteorology. Long periods of stagnation during the winter months allow PM to accumulate over many days with resulting high concentrations. The low values for the annual average in 1988 and 1989 are due to the limited number of monitors with complete data for these years during the startup of the PM monitoring network. The period between 1990 and 2003 provides a better indication of trends. Over this period, the three year average of the annual average of quarters (State) shows a decrease of 17 percent. The calculated number of days exceeding the State and national 24-hour standards also shows a decrease. There were 300 calculated State standard exceedance days and 40 calculated national standard exceedance days during 1988. During 2003, there were 242 calculated State standard exceedance days and no national standard exceedance days.

Although PM_{10} air quality has improved overall in the San Joaquin Valley Air Basin, values for 1999 through 2003 were higher than those for 1998. We will need several more years of data before we can determine whether this trend is a result of meteorology or a change in emissions. However, based on the ambient data, it will still be a number of years before this area reaches attainment.

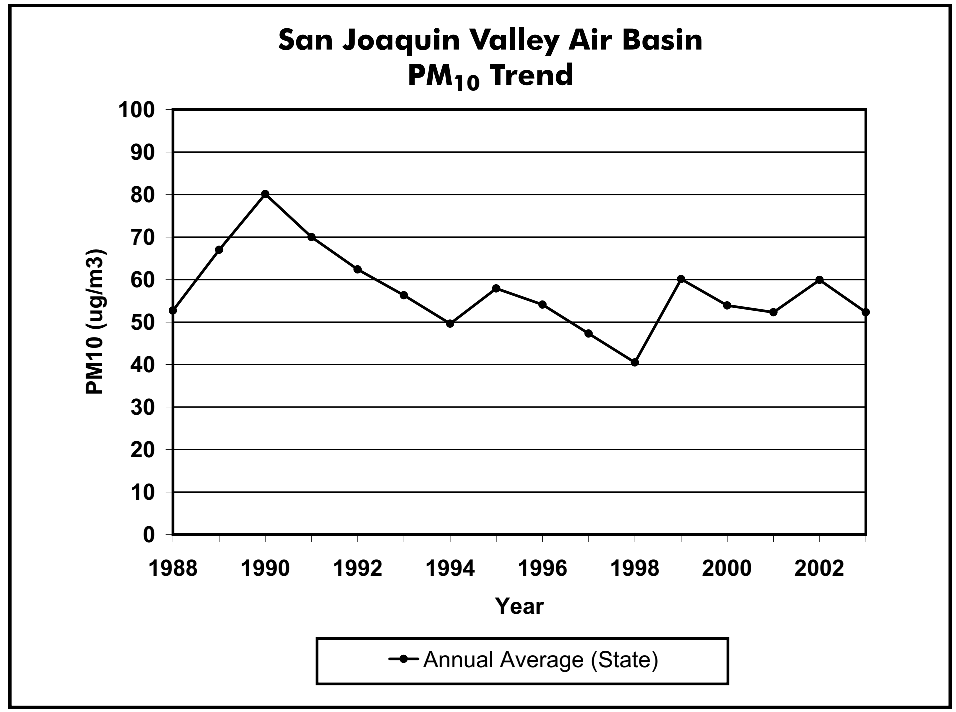

Figure 4-32

PM10 (ug/m3)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Maximum 24-Hr. Concentration (State)					206	237	439	279	186	239	192	279	153	199	167	186	153	221	194	150
Maximum 24-Hr. Concentration (Nat)					244	250	439	279	183	239	190	279	153	199	160	183	145	205	189	150
Annual Average (State)					52.7	67.0	80.1	70.0	62.4	56.3	49.6	57.9	54.1	47.3	40.5	60.1	53.9	52.3	59.9	52.3
Annual Average (Nat)					67.4	79.3	79.3	69.9	62.9	56.3	50.1	58.2	54.1	48.2	39.9	59.5	53.1	57.4	59.2	52.4
Calc Days Above State 24-Hr Std					300	302	313	285	273	233	253	246	225	188	185	216	237	236	267	242
Calc Days Above Nat 24-Hr Std					40	40	56	40	3	11	8	8	0	3	6	12	0	12	8	0

Table 4-32

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San Joaquin Valley Air Basin
Carbon Monoxide Emission Trends and Forecasts

Emissions of CO decreased between 1975 and 2000 and are projected to continue decreasing through 2020. Motor vehicles are by far the largest source of CO emissions. Emissions from motor vehicles have been declining since 1975, despite increases in VMT, with the introduction of new automotive emission controls and fleet turnover.

CO Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***3852***	***3879***	***3659***	***3336***	***2617***	***2076***	***1670***	***1384***	***1187***	***1073***
Stationary Sources	197	169	74	78	65	58	54	55	56	57
Area-wide Sources	408	408	409	406	397	394	392	391	389	387
On-Road Mobile	2895	2869	2784	2428	1751	1252	874	606	416	297
Gasoline Vehicles	2883	2848	2750	2391	1721	1227	851	585	397	280
Diesel Vehicles	12	21	34	37	30	25	24	21	18	18
Other Mobile	352	433	391	425	404	372	349	332	327	332
Gasoline Fuel	176	233	242	276	268	247	228	213	209	214
Diesel Fuel	68	88	76	80	70	58	48	42	38	37
Other Fuel	108	112	74	69	67	67	73	77	79	81

Table 4-33

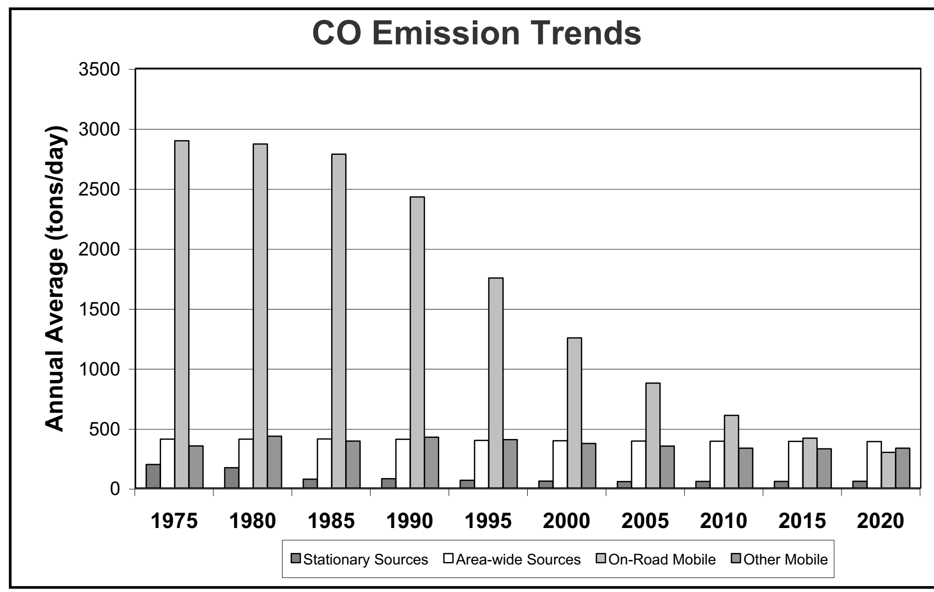

Figure 4-33

San Joaquin Valley Air Basin

Carbon Monoxide Air Quality Trend

Carbon monoxide concentrations show a fairly consistent downward trend from 1984 through 2003. Similar to other areas of the State, the trend line for the San Joaquin Valley Air Basin shows a slight increase during the late 1980s, probably related to meteorology. The maximum peak 8-hour indicator for 2003 is almost 65 percent lower than that for 1984. Measured concentrations in the San Joaquin Valley Air Basin have not exceeded the national CO standards since 1991, and concentrations have not exceeded the State standards for the last eight years. Much of the decline in ambient CO concentrations can be attributed to the introduction of clean fuels and newer, cleaner motor vehicles.

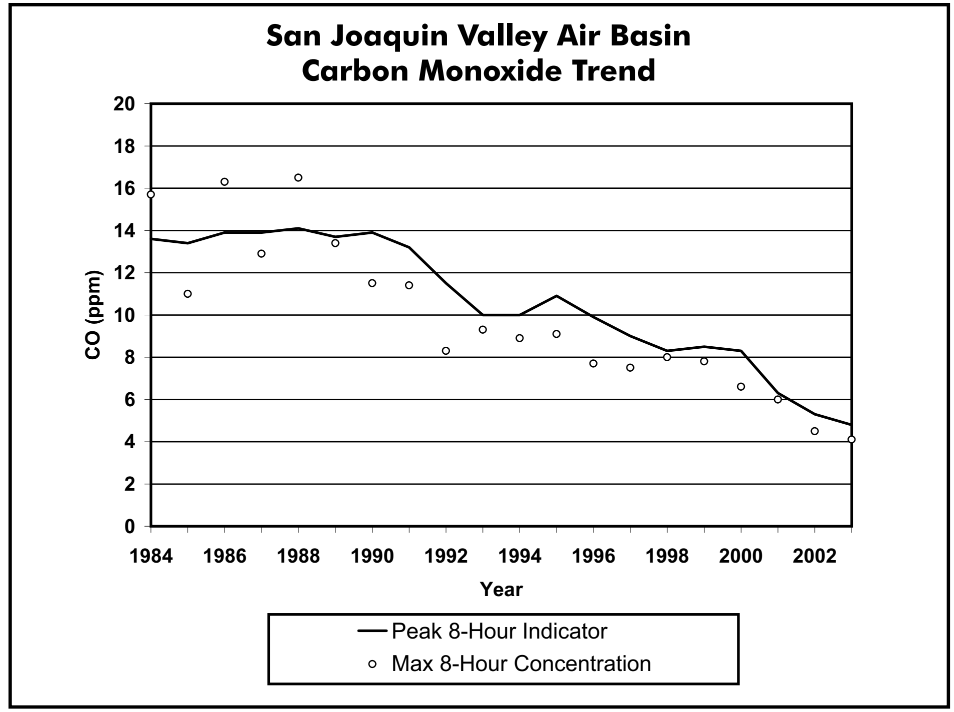

Figure 4-34

CARBON MONOXIDE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Peak 8-Hr. Indicator	13.6	13.4	13.9	13.9	14.1	13.7	13.9	13.2	11.5	10.0	10.0	10.9	9.9	9.0	8.3	8.5	8.3	6.3	5.3	4.8
Maximum 1-Hr. Concentration	24.0	18.0	21.0	16.0	19.0	23.0	17.0	19.0	13.0	13.0	15.0	12.0	11.0	9.9	10.3	11.9	10.1	16.0	6.1	5.8
Maximum 8-Hr. Concentration	15.7	11.0	16.3	12.9	16.5	13.4	11.5	11.4	8.3	9.3	8.9	9.1	7.7	7.5	8.0	7.8	6.6	6.0	4.5	4.1
Days Above State 8-Hr. Std.	7	7	13	4	5	24	10	3	0	2	0	1	0	0	0	0	0	0	0	0
Days Above Nat. 8-Hr. Std.	6	7	11	4	6	18	9	3	0	0	0	0	0	0	0	0	0	0	0	0

Table 4-34

San Joaquin Valley Air Basin

Nitrogen Dioxide

Oxides of Nitrogen Emission Trends and Forecasts

Emissions of NO_x and NO_2 increased between 1975 and 1985. Since 1985, however, emissions decreased and are projected to continue declining in the San Joaquin Valley Air Basin. Both stationary source and motor vehicle NO_x emissions have been reduced by the adoption of more stringent emission standards.

NO_x Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***677***	***842***	***842***	***811***	***686***	***568***	***479***	***400***	***335***	***294***
Stationary Sources	265	354	353	289	220	161	139	136	138	139
Area-wide Sources	13	13	13	12	12	11	11	11	11	11
On-Road Mobile	219	252	292	320	288	239	196	145	98	68
Gasoline Vehicles	169	171	168	174	161	121	83	58	40	29
Diesel Vehicles	50	81	124	145	127	118	113	87	57	39
Other Mobile	180	223	184	191	167	157	133	108	88	76
Gasoline Fuel	4	5	5	6	6	6	7	7	6	6
Diesel Fuel	168	210	174	181	157	145	121	97	77	65
Other Fuel	8	8	5	5	5	5	5	5	5	5

Table 4-35

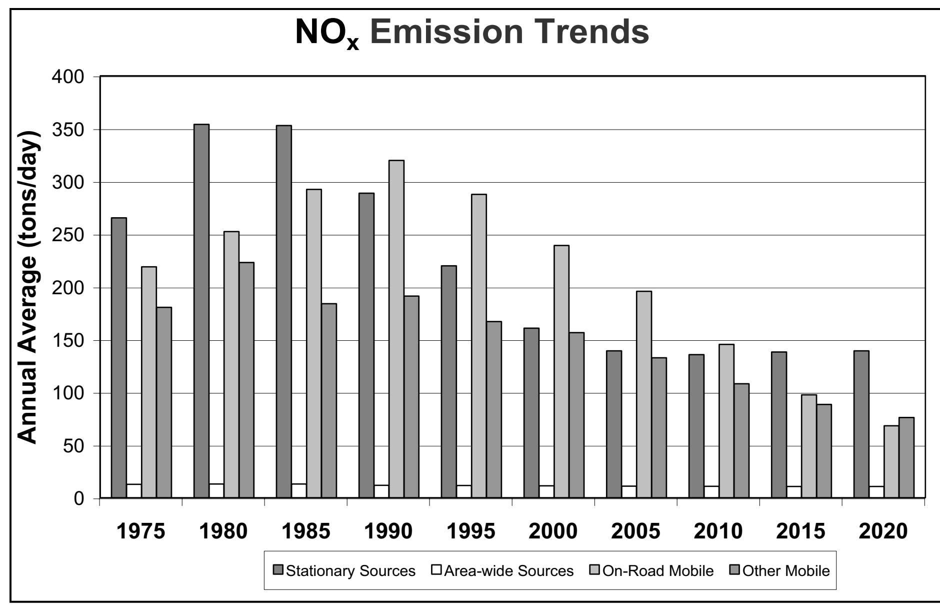

Figure 4-35

San Joaquin Valley Air Basin

Nitrogen Dioxide Air Quality Trend

The San Joaquin Valley has attained both the State and national nitrogen dioxide standards for more than twenty years. During this time-period, there have been no concentrations that exceeded the level of the State 1-hour or the national annual standard. Ambient concentrations continue to be well below the level of both standards. From 1984 through 1989 ambient levels increased somewhat but remained below the level of the standards, and have been significantly decreasing since 1990. The peak 1-hour indicator has declined by more than 32 percent since 1990. This downward trend is expected to continue.

Nitrogen dioxide is formed from emissions of oxides of nitrogen, which also contribute to ozone. As a result, the majority of the future emission control measures will be implemented as part of the overall ozone control strategy. Many of these control measures will target mobile sources, which account for more than three-quarters of California's oxides of nitrogen emissions.

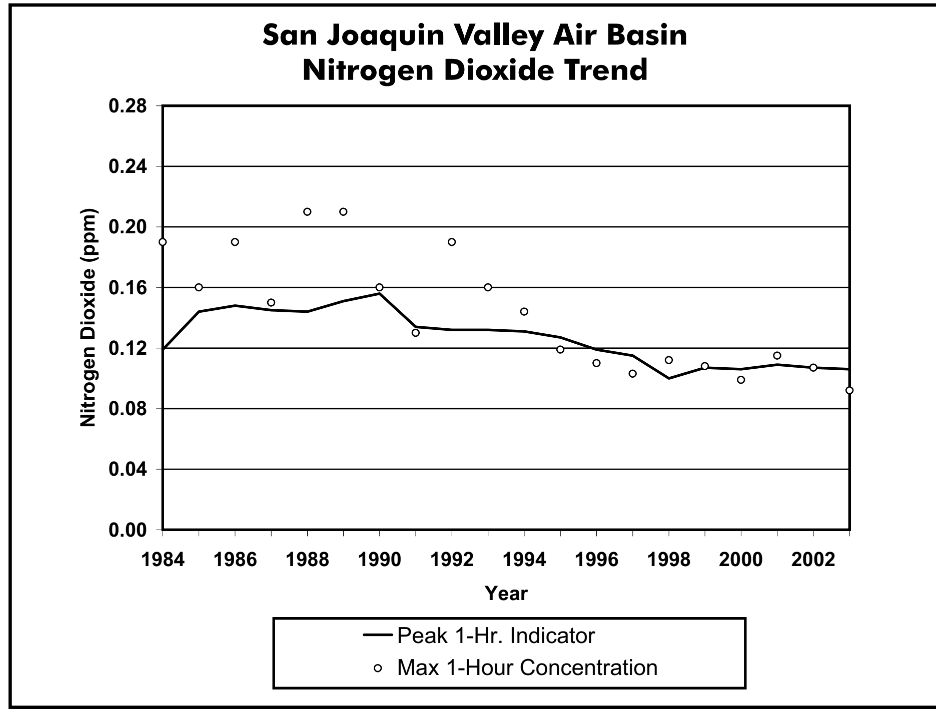

Figure 4-36

NITROGEN DIOXIDE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Peak 1-Hr. Indicator	0.119	0.144	0.148	0.145	0.144	0.151	0.156	0.134	0.132	0.132	0.131	0.127	0.119	0.115	0.100	0.107	0.106	0.109	0.107	0.106
Maximum 1-Hr. Concentration	0.190	0.160	0.190	0.150	0.210	0.210	0.160	0.130	0.190	0.160	0.144	0.119	0.110	0.103	0.112	0.108	0.099	0.115	0.107	0.092
Maximum Annual Average	0.028	0.031	0.030	0.030	0.032	0.033	0.031	0.030	0.027	0.024	0.024	0.029	0.029	0.024	0.023	0.027	0.024	0.022	0.024	0.020

Table 4-36

San Diego Air Basin

Introduction - Area Description

The San Diego Air Basin lies in the southwest corner of California and comprises all of San Diego County. However, the population and emissions are concentrated mainly in the western portion of the County. The air basin covers 4,200 square miles, includes about eight percent of the State's population, and produces about seven percent of the State's criteria pollutant emissions. Because of its southerly location and proximity to the ocean, much of the San Diego Air Basin has a relatively mild climate.

Air quality in the San Diego Air Basin is impacted not only by local emissions, but also by pollutants transported from other areas -- in particular, ozone and ozone precursor emissions transported from the South Coast Air Basin and Mexico. Although the impact of transport is particularly important on days with high ozone concentrations, transported pollutants and emissions cannot be blamed entirely for the ozone problem in the San Diego area. Studies show that emissions from the San Diego Air Basin are sufficient, on their own, to cause ozone violations.

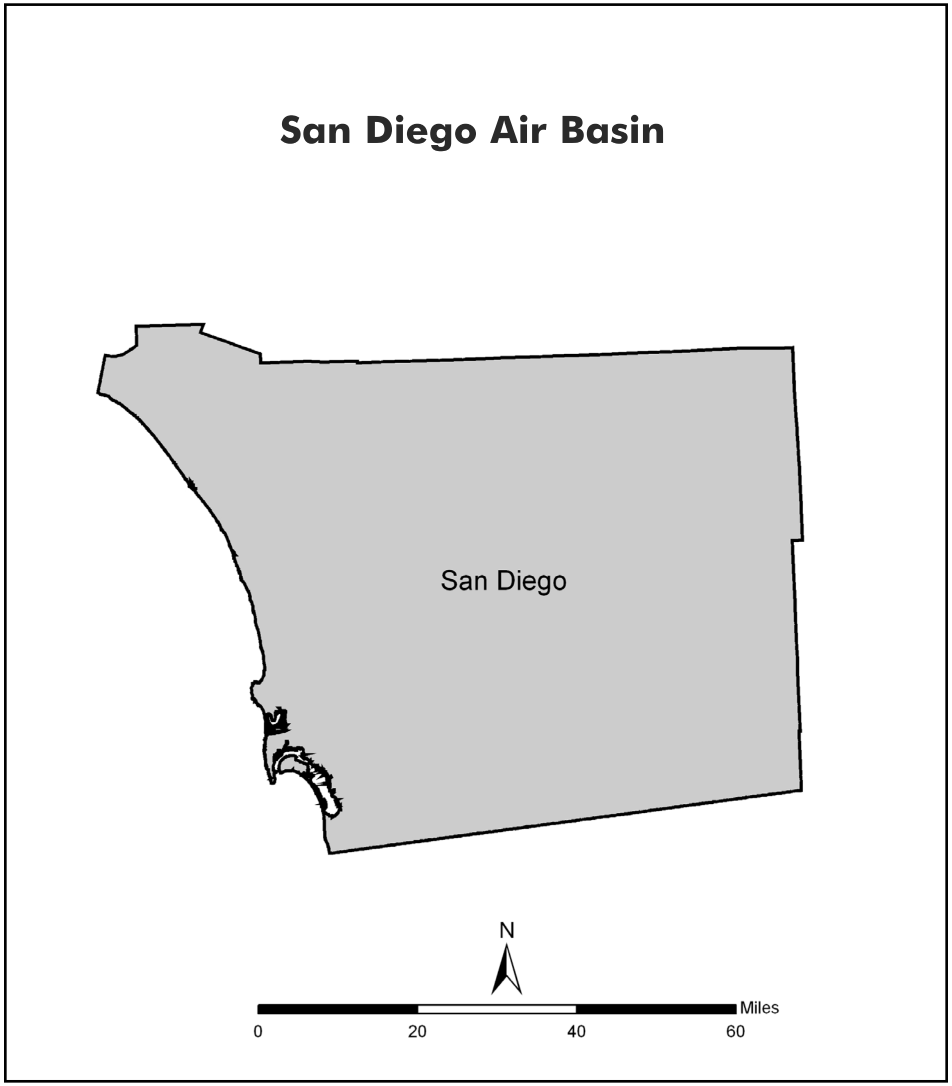

Figure 4-37

San Diego Air Basin

Emission Trends and Forecasts

Emissions of NO_x, ROG, PM_{10}, and CO in the San Diego Air Basin have been following the statewide trends since 1975. These trends are largely due to motor vehicle controls and reductions in evaporative emissions. Mobile sources (both on-road and other) are by far the largest contributors to NO_x, ROG, and CO emissions in the San Diego Air Basin. The majority of the PM_{10} emissions are from area-wide sources.

San Diego Air Basin Emissions (tons/day, annual average)										
Pollutant	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
NO_X	272	264	276	309	262	221	177	142	110	91
ROG	445	442	419	348	271	228	188	175	171	172
PM_{10}	72	81	89	107	104	110	118	125	131	138
$PM_{2.5}$	33	36	34	40	38	40	42	46	47	49
CO	3331	3066	2963	2499	1755	1316	983	798	666	599

Table 4-37

San Diego Air Basin

Population and VMT

Population in the San Diego Air Basin during the 1980-2020 period is projected to more than double: from almost 1.9 million in 1980 to almost 3.9 million in 2020. During this same time period, the number of vehicle miles traveled each day is projected to triple, from almost 32 million miles per day in 1980 to over 97 million miles per day in 2020. As in other parts of California, overall air quality in the San Diego Air Basin has improved, despite high growth rates, indicating the benefits of cleaner technologies.

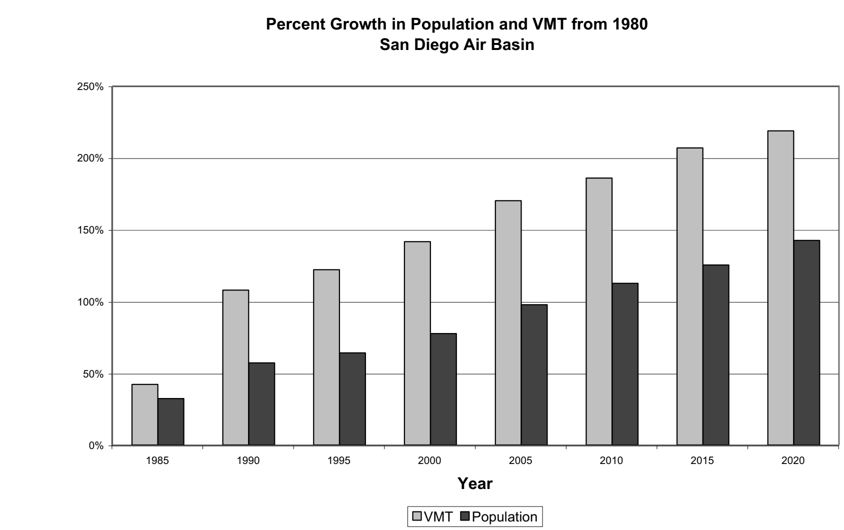

Figure 4-38

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population	1873300	2109300	2504900	2615200	2830100	3149900	3388400	3591300	3863500
Avg. Daily VMT(1000s)	31707	43517	63591	67943	73909	82660	87481	93886	97542

Table 4-38

San Diego Air Basin
Ozone Precursor Emission Trends and Forecasts

Emissions of the ozone precursor NO_x increase between 1975 and 1990 and decrease thereafter. ROG emissions have been decreasing overall since 1975. These decreases are mostly due to decreased emissions from motor vehicles, brought about by stricter motor vehicle emission standards. Stationary and area-wide source emissions of ROG have remained mostly unchanged over the last 20 years, with stricter emission standards offsetting industrial and population growth.

NO_x Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***272***	***264***	***276***	***309***	***262***	***221***	***177***	***142***	***110***	***91***
Stationary Sources	48	32	17	19	17	14	9	12	12	14
Area-wide Sources	3	3	3	3	3	3	3	3	3	3
On-Road Mobile	178	174	195	216	185	149	113	83	57	41
Gasoline Vehicles	168	155	156	157	133	96	62	43	30	22
Diesel Vehicles	10	19	39	59	52	52	51	40	27	20
Other Mobile	44	57	61	71	57	56	52	44	37	33
Gasoline Fuel	3	3	4	5	5	6	6	6	6	5
Diesel Fuel	37	48	51	59	46	43	38	31	24	20
Other Fuel	5	5	6	6	6	7	7	7	7	7

Table 4-39

ROG Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***445***	***442***	***419***	***348***	***271***	***228***	***188***	***175***	***171***	***172***
Stationary Sources	40	58	55	53	45	51	56	64	71	77
Area-wide Sources	36	41	45	48	42	43	40	42	44	46
On-Road Mobile	338	306	274	196	133	89	60	43	33	26
Gasoline Vehicles	337	305	271	193	130	86	58	41	31	25
Diesel Vehicles	1	1	3	3	3	2	2	2	2	1
Other Mobile	31	37	44	51	50	46	32	26	23	22
Gasoline Fuel	24	29	36	41	41	38	25	20	18	16
Diesel Fuel	4	5	5	6	5	5	4	3	3	2
Other Fuel	3	3	3	3	3	3	3	3	3	3

Table 4-40

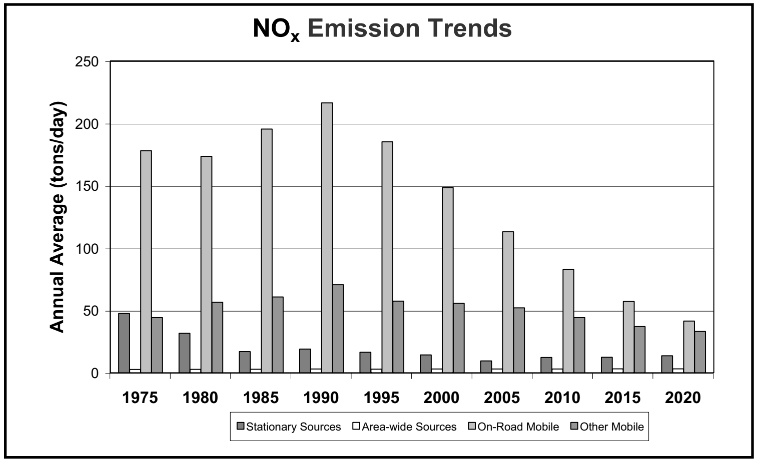

Figure 4-39

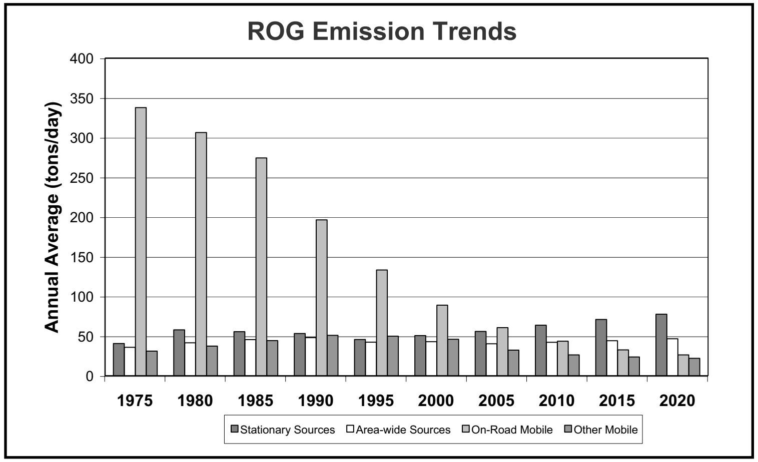

Figure 4-40

San Diego Air Basin

Ozone Air Quality Trend

Both the peak indicator and the number of days above the State and national ozone standards have decreased substantially over the last 20 years. The peak 1-hour ozone indicator shows an overall decline of 41 percent from 1984 to 2003. The number of State and national 1-hour standard exceedance days has dropped even more. There were 146 State standard exceedance days during 1984 compared with 12 during 2004. This represents a decrease of about 87 percent in the three year average of the State standard exceedance days. During 1984, there were 51 national 1-hour standard exceedance days compared with one during 2004. However, there were still eight national 8-hour standard exceedance days during 2004. Another measure of progress is that San Diego now qualifies for attainment of the federal 1-hour standard.

The San Diego Air Basin is the only one of the five major air basins the ARB has not identified as a transport contributor to a downwind area. The San Diego area is, however, a transport receptor. While it is clear that additional local emission controls will be needed to reach attainment of the ozone standards in the San Diego area, because of transport, future air quality in this area will also be affected by emission controls and growth in the South Coast Air Basin and, to some extent, Mexico.

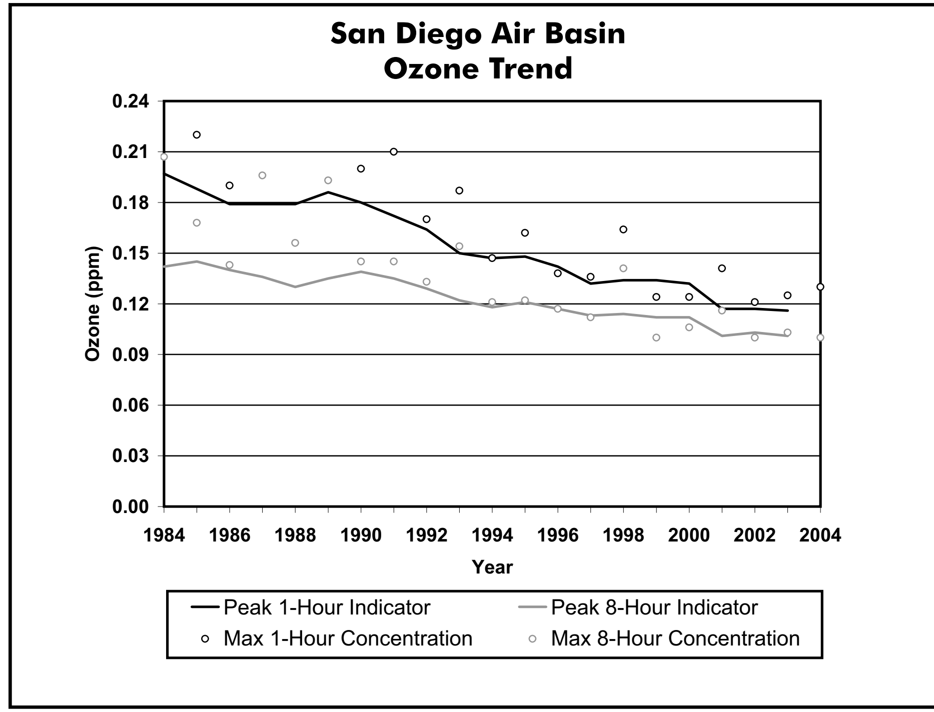

Figure 4-41

OZONE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004[1]
Peak 1-Hour Indicator	0.197	0.188	0.179	0.179	0.179	0.186	0.180	0.172	0.164	0.150	0.147	0.148	0.142	0.132	0.134	0.134	0.132	0.117	0.117	0.116	
Peak 8-Hour Indicator	0.142	0.145	0.140	0.136	0.130	0.135	0.139	0.135	0.129	0.122	0.118	0.121	0.117	0.113	0.114	0.112	0.112	0.101	0.103	0.101	
4th High 1-Hr. in 3 Yrs	0.200	0.210	0.190	0.180	0.180	0.190	0.190	0.170	0.170	0.154	0.150	0.146	0.141	0.138	0.135	0.135	0.131	0.118	0.118	0.118	
Avg. of 4th High 8-Hr. in 3 Yrs	0.126	0.132	0.125	0.124	0.121	0.125	0.129	0.125	0.118	0.112	0.109	0.108	0.104	0.099	0.102	0.099	0.100	0.094	0.095	0.093	
Maximum 1-Hr. Concentration	0.280	0.220	0.190	0.290	0.250	0.250	0.200	0.210	0.170	0.187	0.147	0.162	0.138	0.136	0.164	0.124	0.124	0.141	0.121	0.125	0.130
Maximum 8-Hr. Concentration	0.207	0.168	0.143	0.196	0.156	0.193	0.145	0.145	0.133	0.154	0.121	0.122	0.117	0.112	0.141	0.100	0.106	0.116	0.100	0.103	0.100
Days Above State Standard	146	148	131	127	160	159	139	106	97	90	79	96	51	43	54	27	24	29	15	23	12
Days Above Nat. 1-Hr. Std.	51	50	42	40	45	56	39	27	19	14	9	12	2	1	9	0	0	2	0	1	1
Days Above Nat. 8-Hr. Std.	98	109	81	99	119	122	96	67	66	58	46	48	31	16	35	17	16	17	13	6	8

[1] Preliminary data for January through October 2004 are shown here, however they are subject to change. 2003 is the last year for which complete and approved data is available, thus annual statistics are not included.

Table 4-41

San Diego Air Basin
Directly Emitted PM_{10} Emission Trends and Forecasts

Direct emissions of PM_{10} are projected to almost double in the San Diego Air Basin between 1975 and 2020. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, dust from construction and demolition operations, and particulates from residential fuel combustion (including wood). The growth in these area-wide sources is primarily due to population growth and increases in VMT.

Particulate matter can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere from the reaction of gaseous precursors such as NO_x, SO_x ROG, and ammonia (secondary PM). The PM_{10} emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM_{10} emissions contribute approximately 70 percent of the ambient PM_{10} in the San Diego Air Basin.

Directly Emitted PM_{10} Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***72***	***81***	***89***	***107***	***104***	***110***	***118***	***125***	***131***	***138***
Stationary Sources	17	12	5	7	10	7	8	11	11	12
Area-wide Sources	48	60	73	88	84	92	99	104	110	116
On-Road Mobile	3	3	4	5	4	4	5	5	5	5
Gasoline Vehicles	2	2	2	2	3	3	3	4	4	4
Diesel Vehicles	1	1	2	3	2	1	1	1	1	1
Other Mobile	5	6	6	7	6	6	6	6	5	5
Gasoline Fuel	0	1	1	1	1	1	1	1	1	2
Diesel Fuel	3	4	4	4	3	3	3	2	2	2
Other Fuel	2	2	2	2	2	2	2	2	2	2

Table 4-42

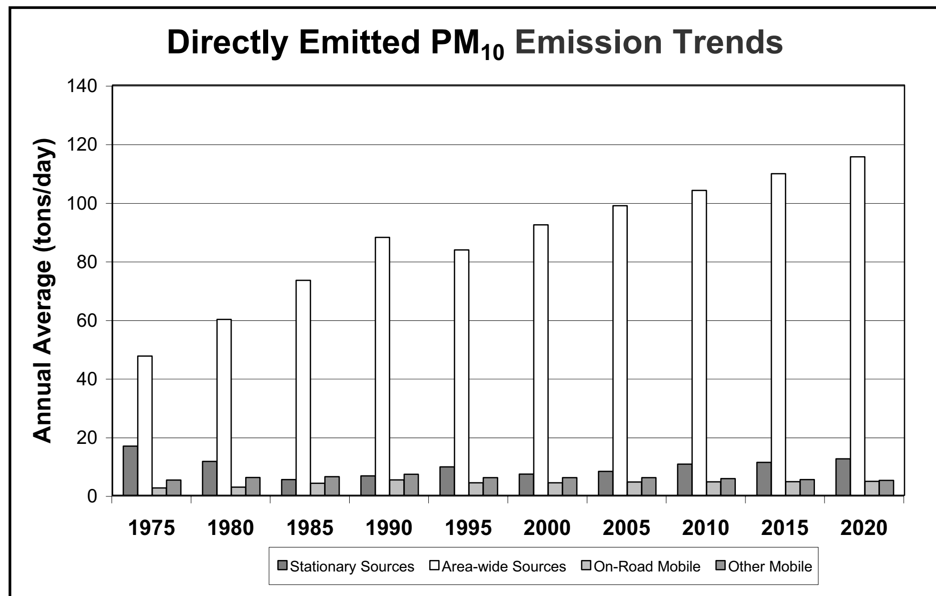

Figure 4-42

San Diego Air Basin
Directly Emitted $PM_{2.5}$ Emission Trends and Forecasts

Direct emissions of $PM_{2.5}$ increased steadily in the San Diego Air Basin between 1975 and 2000 and are projected to continue increasing through 2020. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, dust from construction and demolition operations, and particulates from residential fuel combustion (including wood). The growth in these area-wide sources is primarily due to population growth and increases in VMT.

Particulate matter can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere from the reaction of gaseous precursors such as NOx, SOx, ROG, and ammonia (secondary PM). The $PM_{2.5}$ emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted $PM_{2.5}$ emissions contribute approximately 50 percent of the ambient $PM_{2.5}$ in the San Diego Air Basin.

Directly Emitted $PM_{2.5}$ Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***33***	***36***	***34***	***40***	***38***	***40***	***42***	***46***	***47***	***49***
Stationary Sources	11	9	3	4	6	6	7	9	9	11
Area-wide Sources	16	19	22	25	24	26	27	28	30	31
On-Road Mobile	2	2	3	4	3	3	3	3	3	3
Gasoline Vehicles	1	1	1	1	1	2	2	2	2	3
Diesel Vehicles	0	1	2	3	2	1	1	1	1	1
Other Mobile	5	6	6	7	6	6	5	5	5	5
Gasoline Fuel	0	0	1	1	1	1	1	1	1	1
Diesel Fuel	3	3	3	4	3	3	3	2	2	1
Other Fuel	2	2	2	2	2	2	2	2	2	2

Table 4-43

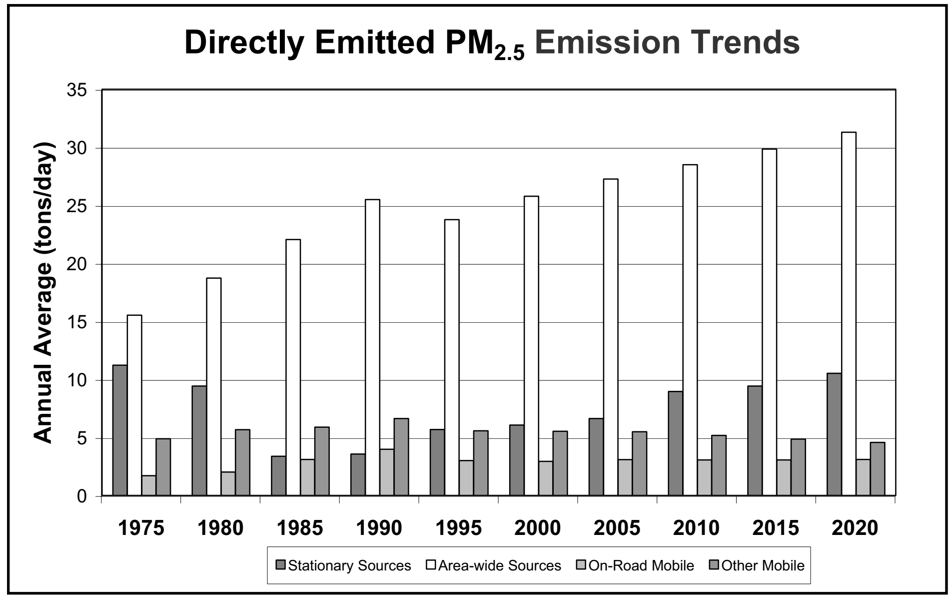

Figure 4-43

San Diego Air Basin

PM_{10} Air Quality Trend

PM_{10} concentrations in the San Diego Air Basin have changed little during the years for which reliable data are available. The annual average for 2003 exceeds the State annual standard and is actually higher than it was during 1989. This apparent lack of progress is a result of monitoring that began at a new site, with higher concentrations, during 1993. The maximum 24-hour concentration also exceeds the State standard. During 2003, the maximum 24-hour concentration (state) was 289 $\mu g/m^3$. This value was due to the severe wildfires that occurred in Southern California in October of 2003.

During 1988, there were 105 calculated State standard exceedance days, compared with 147 during 2003. Again, some of this apparent increase is attributable to the new site that began operating in 1993. There is a substantial amount of variability from year-to-year in the 24-hour statistics. This variability is a reflection of meteorology, the 1-in-6-day sampling schedule, and changes in monitoring location. Although ambient PM_{10} concentrations in the San Diego Air Basin are not as high as in some other areas of the State, additional emission controls will be needed to bring this area into attainment.

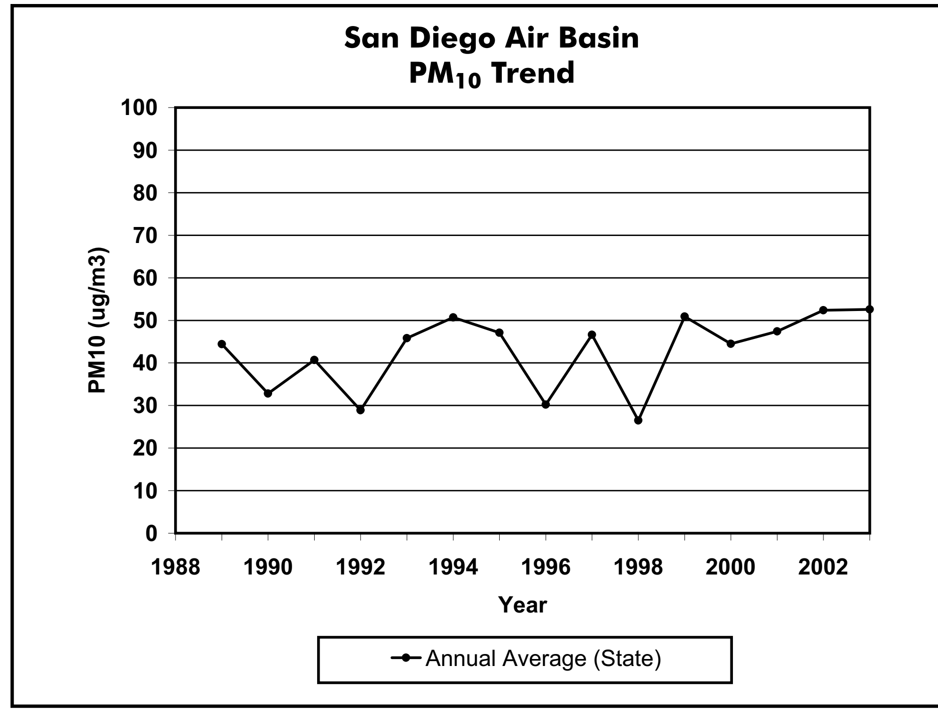

Figure 4-44

PM_{10} (ug/m3)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Maximum 24-Hr. Concentration (State)					80	90	115	81	67	159	129	121	93	125	57	119	136	106	131	289
Maximum 24-Hr. Concentration (Nat)					81	90	115	81	67	159	129	121	93	125	89	121	139	107	130	280
Annual Average (State)						44.4	32.8	40.7	28.9	45.8	50.7	47.1	30.2	46.6	26.5	50.9	44.5	47.4	52.4	52.6
Annual Average (Nat)					40.0	43.8	37.6	40.6	35.9	45.9	50.7	46.8	30.0	46.6	42.5	52.2	45.2	49.1	54.9	52.1
Calc Days Above State 24-Hr Std					105	146	60	90	42	143.5	131	117	96	125	108	140	144	146	186	147
Calc Days Above Nat 24-Hr Std					0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	9

Table 4-44

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San Diego Air Basin
Carbon Monoxide Emission Trends and Forecasts

CO emissions in the San Diego Air Basin mirror the decreasing statewide trend from 1975 to 2020, even though the VMT are increasing. This is yet another example of how California's motor vehicle control program is having a positive impact on CO emissions.

CO Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***3331***	***3066***	***2963***	***2499***	***1755***	***1316***	***983***	***798***	***666***	***599***
Stationary Sources	30	29	28	28	26	40	33	48	48	53
Area-wide Sources	56	62	68	72	64	66	68	70	72	75
On-Road Mobile	3059	2740	2586	2067	1360	930	626	438	306	225
Gasoline Vehicles	3056	2735	2575	2052	1347	918	616	429	298	217
Diesel Vehicles	3	6	11	15	13	11	11	9	8	8
Other Mobile	186	235	281	333	305	280	256	241	240	246
Gasoline Fuel	148	189	235	280	258	238	215	200	199	205
Diesel Fuel	16	22	24	28	22	19	17	16	15	14
Other Fuel	23	24	23	25	25	24	25	26	26	26

Table 4-45

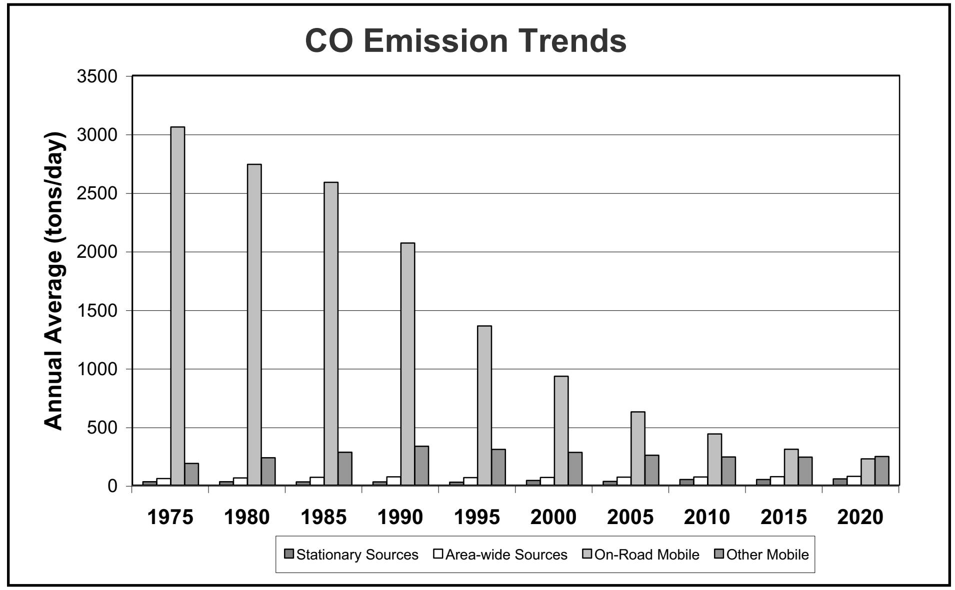

Figure 4-45

San Diego Air Basin

Carbon Monoxide Air Quality Trend

The peak 8-hour indicator for carbon monoxide in the San Diego Air Basin decreased substantially over the trend period: a 46 percent decrease from 1984 to 2003. As a result of these decreases, the national CO standards had not been exceeded in the San Diego Air Basin since 1989. In 2003, the CO standards were exceeded due to extensive wildfires that impacted air quality throughout Southern California. This exceedance does not impact San Diego's attainment status.

With existing and anticipated motor vehicle and clean fuels regulations, ambient CO concentrations should continue to decline. This should be sufficient to maintain a healthful level of carbon monoxide in this area.

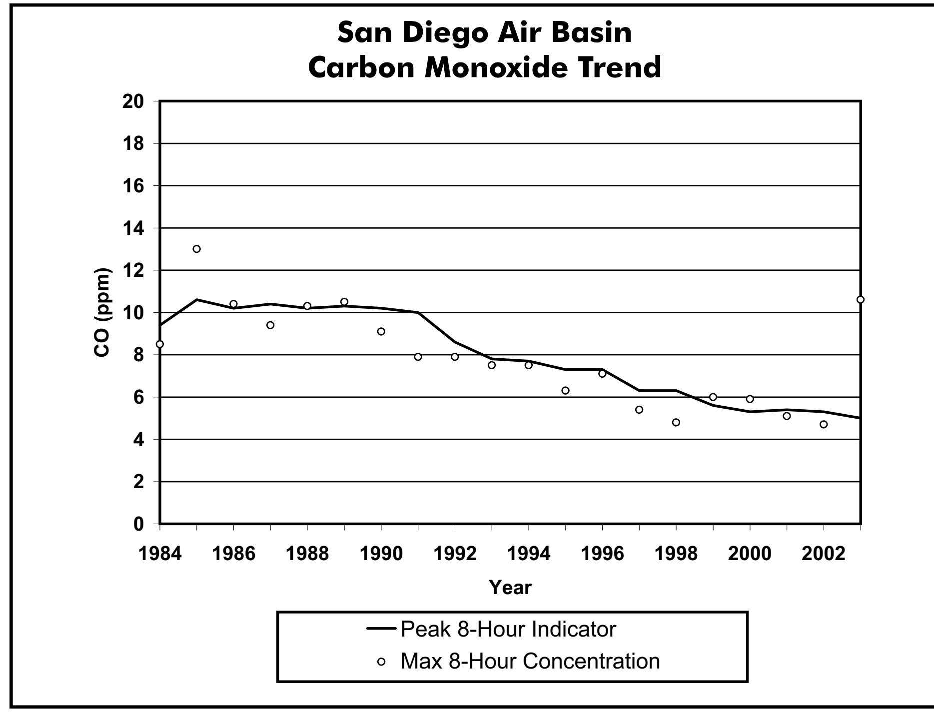

Figure 4-46

CARBON MONOXIDE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Peak 8-Hr. Indicator	9.4	10.6	10.2	10.4	10.2	10.3	10.2	10.0	8.6	7.8	7.7	7.3	7.3	6.3	6.3	5.6	5.3	5.4	5.3	5.0
Maximum 1-Hr. Concentration	16.0	17.0	16.0	14.0	17.0	17.0	18.0	14.0	14.0	11.4	11.0	9.9	12.4	9.3	10.2	9.9	9.3	8.5	8.5	12.7
Maximum 8-Hr. Concentration	8.5	13.0	10.4	9.4	10.3	10.5	9.1	7.9	7.9	7.5	7.5	6.3	7.1	5.4	4.8	6.0	5.9	5.1	4.7	10.6
Days Above State 8-Hr. Std.	0	5	2	1	5	6	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Days Above Nat. 8-Hr. Std.	0	3	1	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Table 4-46

San Diego Air Basin
Nitrogen Dioxide
Oxides of Nitrogen Emission Trends and Forecasts

NO_x and NO_2 emissions in the San Diego Air Basin follow the declining statewide trend from 1990 to 2020. The continued adoption of more stringent motor vehicle and stationary source emission standards should continue to reduce nitrogen dioxide emissions.

NO_x Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***272***	***264***	***276***	***309***	***262***	***221***	***177***	***142***	***110***	***91***
Stationary Sources	48	32	17	19	17	14	9	12	12	14
Area-wide Sources	3	3	3	3	3	3	3	3	3	3
On-Road Mobile	178	174	195	216	185	149	113	83	57	41
Gasoline Vehicles	168	155	156	157	133	96	62	43	30	22
Diesel Vehicles	10	19	39	59	52	52	51	40	27	20
Other Mobile	44	57	61	71	57	56	52	44	37	33
Gasoline Fuel	3	3	4	5	5	6	6	6	6	5
Diesel Fuel	37	48	51	59	46	43	38	31	24	20
Other Fuel	5	5	6	6	6	7	7	7	7	7

Table 4-47

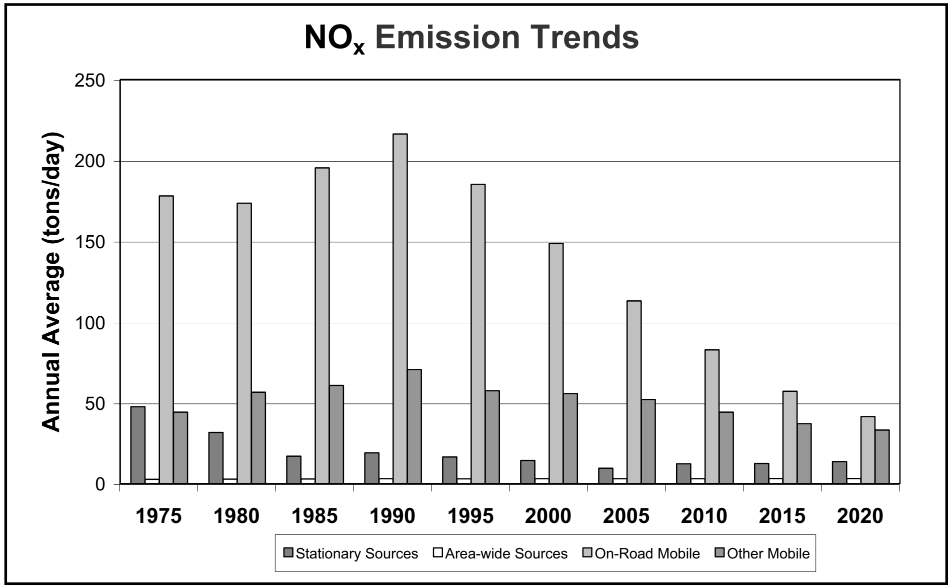

Figure 4-47

San Diego Air Basin

Nitrogen Dioxide Air Quality Trend

The San Diego Air Basin attains the State and national nitrogen dioxide standard. Maximum 1-hour concentrations during the 1980s occasionally exceeded the level of the State 1-hour standard. However, these exceedances did not affect the area's attainment status. Ambient concentrations are now well below the levels of both the State and national standards. Data show that the maximum peak 1-hour indicator decreased almost 29 percent from 1984 to 2003.

Because NO_x emissions contribute to ozone, as well as to NO_2, many of the ozone control measures help reduce ambient NO_2 concentrations. Furthermore, NO_x emission controls are a critical part of the ozone control strategy and are not expected to be relaxed in the future. As a result, these controls should ensure continued attainment of the State and national nitrogen dioxide standards.

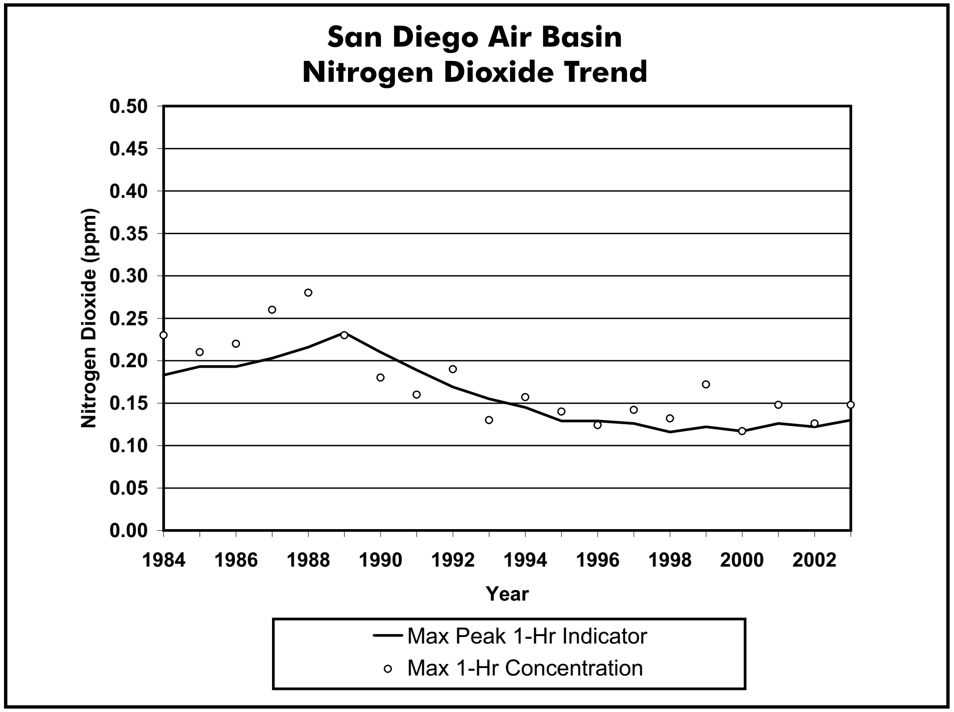

Figure 4-48

NITROGEN DIOXIDE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Peak 1-Hr. Indicator	0.183	0.193	0.193	0.203	0.216	0.233	0.210	0.189	0.169	0.155	0.145	0.129	0.129	0.126	0.116	0.122	0.117	0.126	0.122	0.130
Maximum 1-Hr. Concentration	0.230	0.210	0.220	0.260	0.280	0.230	0.180	0.160	0.190	0.130	0.157	0.140	0.124	0.142	0.132	0.172	0.117	0.148	0.126	0.148
Maximum Annual Average	0.031	0.032	0.030	0.032	0.035	0.031	0.029	0.029	0.027	0.023	0.024	0.026	0.022	0.024	0.023	0.026	0.024	0.022	0.022	0.021

Table 4-48

Sacramento Valley Air Basin

Introduction - Area Description

The Sacramento Valley Air Basin is home to California's capital. Located in the northern portion of the Central Valley, the Sacramento Valley Air Basin includes Butte, Colusa, Glenn, Sacramento, Shasta, Sutter, Tehama, Yolo, and Yuba counties, the western urbanized portion of Placer County, and the northeastern portion of Solano County. The Sacramento Valley Air Basin occupies 14,994 square miles and has a population of more than two million people.

Because of its inland location, the climate of the Sacramento Valley Air Basin is more extreme than the climate in the San Francisco Bay Area Air Basin or South Coast Air Basin. The winters are generally cool and wet, while the summers are hot and dry.

Emissions from the urbanized portion of the basin (Sacramento, Yolo, Solano, and Placer Counties) dominate the emission inventory for the Sacramento Valley Air Basin, and on-road motor vehicles are the primary source of emissions in the metropolitan area. While pollutant concentrations have generally declined over the years, additional regulations will be needed to attain the State and national ambient air quality standards in this air basin.

Figure 4-49

Sacramento Valley Air Basin

Emission Trends and Forecasts

The emission levels in the Sacramento Valley Air Basin are trending downward from 1990 to 2020 for NO_x, and downward from 1975 to 2020 for ROG and CO. The decreases in NO_x, ROG, and CO are largely due to motor vehicle controls and reductions in evaporative emissions. Mobile sources are by far the largest contributors to NO_x, ROG, and CO emissions in the Sacramento Valley Air Basin. PM_{10} and $PM_{2.5}$ emissions are increasing from 1975 to 2020.

Sacramento Valley Air Basin Emissions (tons/day, annual average)										
Pollutant	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
NO_X	329	356	351	384	337	295	246	200	162	137
ROG	454	442	412	366	302	244	207	187	177	174
PM_{10}	195	203	210	223	216	225	231	239	247	253
$PM_{2.5}$	85	85	87	93	87	89	91	92	94	96
CO	2970	2981	2851	2517	1902	1482	1224	1035	909	833

Table 4-49

Sacramento Valley Air Basin

Population and VMT

Between 1980 and 2020, population in the Sacramento Valley Air Basin is projected to grow at a higher rate than the statewide average--a 125 percent increase compared with a 93 percent increase statewide. Population is projected to grow from 15 million in 1980 to 34 million in 2020. During this same period, the increase in the number of vehicle miles traveled each day is projected to be higher than the overall statewide value: a 201 percent increase in the Sacramento Valley Air Basin. VMT are projected to increase from nearly 28 million miles in 1980 to 84 million miles in 2020.

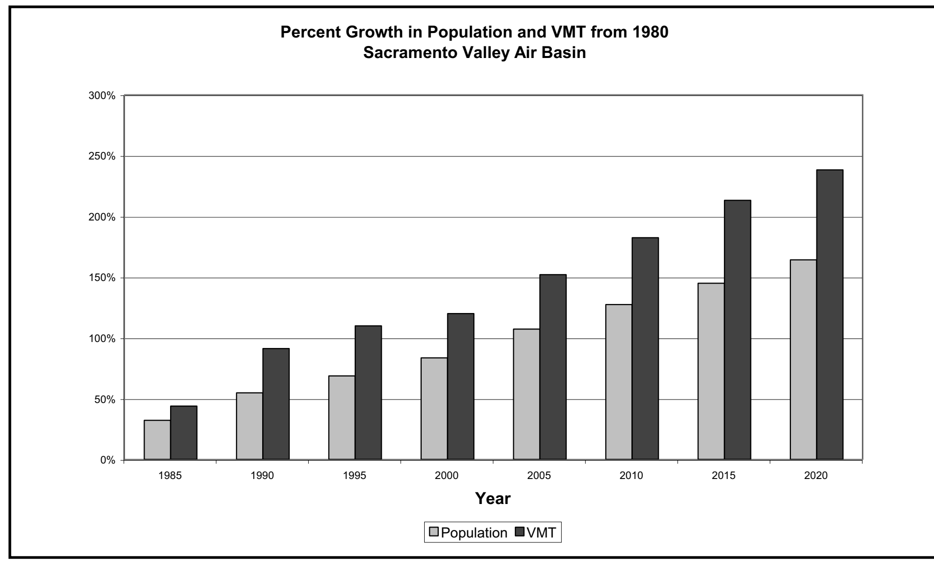

Figure 4-50

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population	1500900	1688200	1977600	2155550	2344950	2647200	2904700	3128100	3374700
Avg. Daily VMT(1000s)	27881	35762	47540	52178	54681	62630	70184	77831	84078

Table 4-50

Sacramento Valley Air Basin

Ozone Precursor Emission Trends and Forecasts

Emissions of NO_x decreased from 1990 to 2000 and are projected to continue decreasing from 2000 to 2020. On-road motor vehicles and other mobile sources are by far the largest contributors to NO_x emissions. More stringent mobile source emission standards and cleaner burning fuels have largely contributed to the decline in NO_x emissions. ROG emissions have been decreasing for the last 30 years due to more stringent motor vehicle standards and new rules for control of ROG from various industrial coating and solvent operations.

NO_x Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***329***	***356***	***351***	***384***	***337***	***295***	***246***	***200***	***162***	***137***
Stationary Sources	36	30	29	43	45	41	38	40	40	40
Area-wide Sources	7	8	8	9	8	8	8	8	8	9
On-Road Mobile	179	194	208	216	182	147	113	80	53	36
Gasoline Vehicles	147	148	143	132	112	78	54	38	25	18
Diesel Vehicles	32	46	65	84	70	68	59	43	27	18
Other Mobile	107	124	107	115	102	99	86	72	61	53
Gasoline Fuel	3	3	4	5	5	6	7	7	6	6
Diesel Fuel	103	118	100	108	95	91	76	62	52	44
Other Fuel	2	2	2	2	2	3	3	3	3	3

Table 4-51

ROG Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***454***	***442***	***412***	***366***	***302***	***244***	***207***	***187***	***177***	***174***
Stationary Sources	88	64	58	59	48	39	39	43	47	51
Area-wide Sources	61	68	66	74	70	68	66	68	70	73
On-Road Mobile	272	268	243	180	130	86	62	44	32	24
Gasoline Vehicles	270	265	239	176	126	83	59	42	30	23
Diesel Vehicles	2	3	4	4	3	3	3	2	2	1
Other Mobile	33	42	45	52	54	52	39	32	28	26
Gasoline Fuel	22	29	34	41	44	42	30	24	21	20
Diesel Fuel	9	11	9	10	9	8	7	6	4	3
Other Fuel	1	3	2	2	2	2	2	2	2	2

Table 4-52

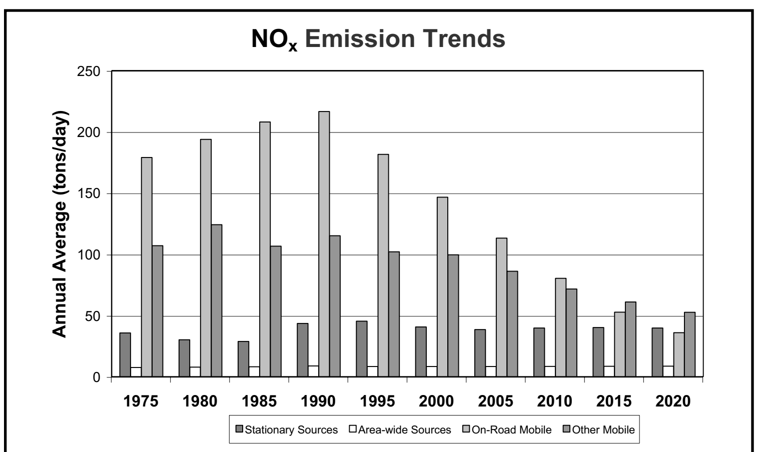

Figure 4-51

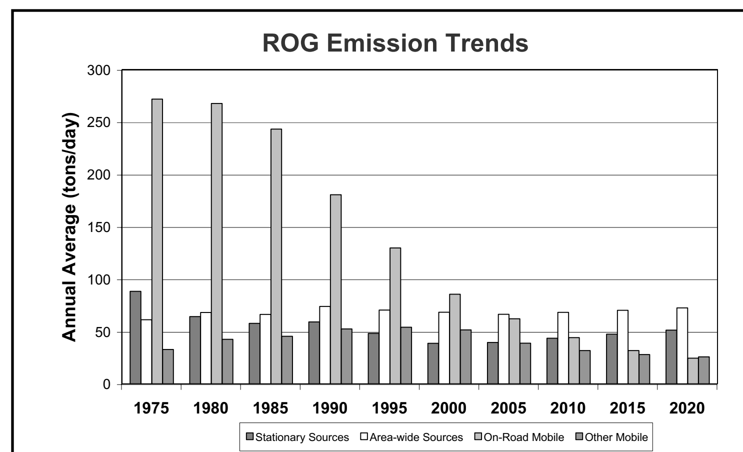

Figure 4-52

Sacramento Valley Air Basin

Ozone Air Quality Trend

Peak ozone values in the Sacramento Valley Air Basin have not declined as quickly over the last several years as they have in other urban areas. The maximum peak 1-hour indicator remained fairly constant from 1984 to 1988. Since 1988, the peak 1-hour indicator has decreased slightly, and the overall decline for the 20-year period is about 15 percent. Looking at the number of days above the State and national standards, the trend is much more variable. However, the number of exceedance days has declined since 1988. The maximum measured 1-hour concentrations have also decreased, but with more year-to-year variation.

Similar to the San Joaquin Valley, the urbanized portion of the Sacramento Valley Air Basin, along with urbanized portions of El Dorado and Placer Counties in the Mountain Counties Air Basin, is identified as both a transport contributor and receptor. The region is a transport contributor to the Mountain Counties, San Joaquin Valley, and San Francisco Bay Area Air Basins, and a receptor for the San Francisco Bay Area and San Joaquin Valley Air Basins.

The data for the Sacramento Metropolitan Area, on the following page, reflects the portion of the region that is nonattainment for the national ozone standards.

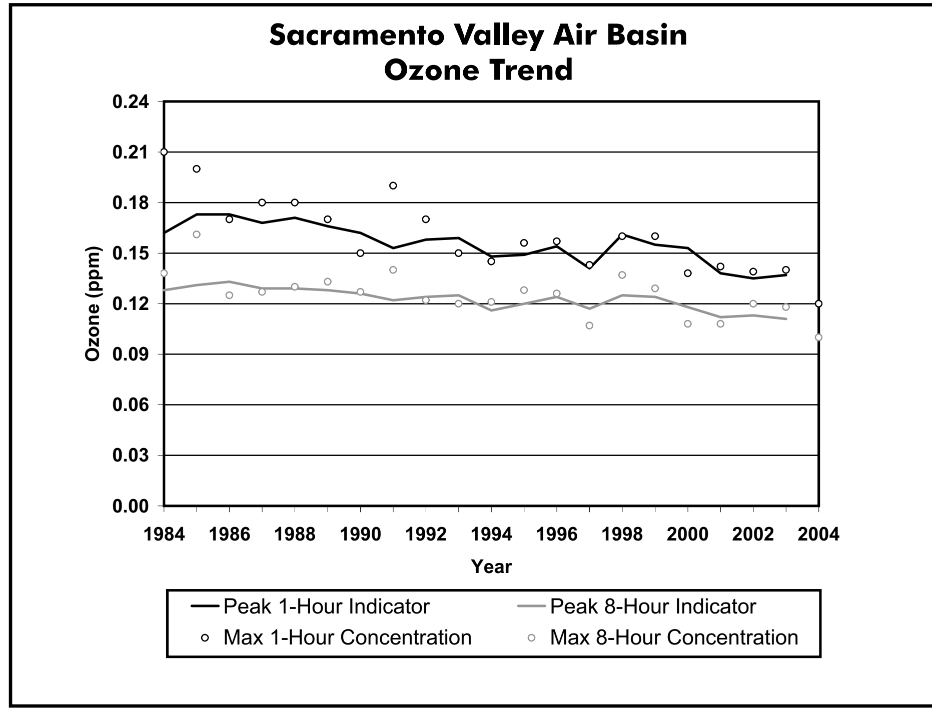

Figure 4-53

OZONE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004[1]
Peak 1-Hour Indicator	0.162	0.173	0.173	0.168	0.171	0.166	0.162	0.153	0.158	0.159	0.148	0.149	0.154	0.141	0.161	0.155	0.153	0.138	0.135	0.137	
Peak 8-Hour Indicator	0.128	0.131	0.133	0.129	0.129	0.128	0.126	0.122	0.124	0.125	0.116	0.120	0.124	0.117	0.125	0.124	0.118	0.112	0.113	0.111	
4th High 1-Hr. in 3 Yrs	0.180	0.180	0.180	0.160	0.160	0.160	0.160	0.150	0.150	0.150	0.143	0.145	0.145	0.133	0.148	0.148	0.148	0.133	0.132	0.138	
Avg. of 4th High 8-Hr. in 3 Yrs	0.115	0.118	0.118	0.114	0.114	0.114	0.107	0.105	0.105	0.110	0.104	0.106	0.106	0.097	0.097	0.101	0.105	0.101	0.101	0.100	
Maximum 1-Hr. Concentration	0.210	0.200	0.170	0.180	0.180	0.170	0.150	0.190	0.170	0.150	0.145	0.156	0.157	0.143	0.160	0.160	0.138	0.142	0.139	0.140	0.120
Maximum 8-Hr. Concentration	0.138	0.161	0.125	0.127	0.130	0.133	0.127	0.140	0.122	0.120	0.121	0.128	0.126	0.107	0.137	0.129	0.108	0.108	0.120	0.118	0.100
Days Above State Standard	64	59	66	94	98	68	50	68	74	34	60	50	58	25	62	59	41	45	46	51	35
Days Above Nat. 1-Hr. Std.	23	19	24	24	35	8	16	14	14	7	9	11	9	3	14	7	5	2	7	5	0
Days Above Nat. 8-Hr. Std.	46	42	50	73	68	37	44	60	56	22	48	40	44	15	60	43	35	37	34	40	26

[1] Preliminary data for January through October 2004 are shown here, however they are subject to change. 2003 is the last year for which complete and approved data is available, thus annual statistics are not included.

Table 4-53

Sacramento Metropolitan Area[1]

Ozone Air Quality Table

OZONE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004[2]
Peak 1-Hour Indicator	0.162	0.173	0.173	0.168	0.171	0.166	0.162	0.153	0.158	0.159	0.148	0.149	0.154	0.141	0.161	0.155	0.153	0.139	0.143	0.146	
Peak 8-Hour Indicator	0.128	0.131	0.133	0.129	0.129	0.128	0.126	0.122	0.124	0.125	0.116	0.120	0.124	0.117	0.125	0.124	0.118	0.112	0.113	0.111	
4th High 1-Hr in 3 Yrs	0.180	0.180	0.180	0.160	0.160	0.160	0.160	0.150	0.150	0.150	0.143	0.145	0.145	0.133	0.148	0.148	0.148	0.133	0.143	0.143	
Avg of 4th Hi 8-Hr in 3 Yrs	0.115	0.118	0.118	0.114	0.114	0.114	0.107	0.105	0.105	0.110	0.104	0.106	0.106	0.099	0.103	0.103	0.107	0.104	0.106	0.107	
Maximum 1-Hr. Concentration	0.210	0.200	0.170	0.180	0.180	0.170	0.150	0.190	0.170	0.150	0.145	0.156	0.157	0.145	0.163	0.160	0.138	0.148	0.156	0.145	0.120
Maximum 8-Hr. Concentration	0.138	0.161	0.125	0.127	0.138	0.133	0.127	0.140	0.122	0.120	0.121	0.128	0.126	0.107	0.137	0.129	0.113	0.109	0.137	0.122	0.100
Days Above State Standard	63	54	57	86	97	74	47	65	76	36	54	52	58	25	49	56	46	52	59	53	35
Days Above Nat. 1-Hr. Std.	22	19	23	22	35	9	14	14	14	7	9	11	11	4	13	7	7	3	10	6	0
Days Above Nat. 8-Hr. Std.	46	37	49	64	72	53	43	57	55	24	42	42	48	19	34	48	37	41	47	43	26

1 The Sacramento Metropolitan Area includes urbanized portions of the Sacramento Valley Air Basin (Sacramento, Yolo, Placer, and Solano Counties, and part of Sutter County) and all of El Dorado and Placer Counties in the Mountain Counties Air Basin.

2 Preliminary data for January through October 2004 are shown here, however they are subject to change. 2003 is the last year for which complete and approved data is available, thus annual statistics are not included.

Table 4-54

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Sacramento Valley Air Basin
Directly Emitted PM_{10} Emission Trends and Forecasts

Direct emissions of PM_{10} increased in the Sacramento Valley Air Basin between 1975 and 2000 and are projected to continue increasing through 2020. Emissions are dominated by contributions from area-wide sources, primarily fugitive dust from paved and unpaved roads, fugitive dust from construction and demolition, and particulates from residential fuel combustion. Emissions of directly emitted PM_{10} from mobile sources and stationary sources in the Sacramento Valley Air Basin have remained relatively steady.

Particulate matter can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia (secondary PM). The PM_{10} emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM_{10} emissions contribute approximately 75 percent of the ambient PM_{10} in the Sacramento Valley Air Basin.

Directly Emitted PM_{10} Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***195***	***203***	***210***	***223***	***216***	***225***	***231***	***239***	***247***	***253***
Stationary Sources	25	19	17	21	17	18	18	19	20	21
Area-wide Sources	160	172	181	189	189	197	204	211	217	223
On-Road Mobile	3	4	5	5	4	4	4	4	4	4
Gasoline Vehicles	1	1	1	2	2	2	2	3	3	3
Diesel Vehicles	2	2	3	4	2	2	1	1	1	1
Other Mobile	7	8	7	7	6	6	6	6	5	5
Gasoline Fuel	0	1	1	1	1	1	2	2	2	2
Diesel Fuel	6	7	6	6	5	5	4	4	3	2
Other Fuel	0	0	0	0	0	0	0	0	0	0

Table 4-55

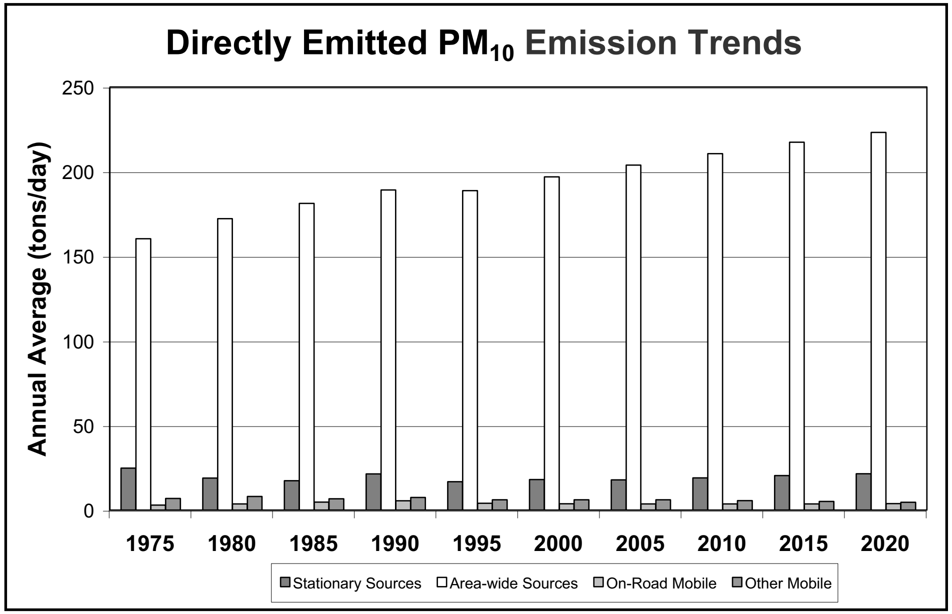

Figure 4-54

Sacramento Valley Air Basin

Directly Emitted $PM_{2.5}$ Emission Trends and Forecasts

Direct emissions of $PM_{2.5}$ increased slightly in the Sacramento Valley Air Basin between 1975 and 2000 and are projected to increase through 2020. Emissions are dominated by contributions from area-wide sources, primarily fugitive dust from paved and unpaved roads, fugitive dust from construction and demolition, and particulates from residential fuel combustion. Emissions of directly emitted $PM_{2.5}$ from mobile sources and stationary sources in the Sacramento Valley Air Basin have remained relatively steady.

Particulate matter can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia (secondary PM). The $PM_{2.5}$ emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted $PM_{2.5}$ emissions contribute approximately 70 percent of the ambient $PM_{2.5}$ in the Sacramento Valley Air Basin.

Directly Emitted $PM_{2.5}$ Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***85***	***85***	***87***	***93***	***87***	***89***	***91***	***92***	***94***	***96***
Stationary Sources	18	12	11	14	10	11	11	12	13	13
Area-wide Sources	59	63	66	69	68	70	72	73	75	76
On-Road Mobile	2	3	4	4	3	3	3	2	2	2
Gasoline Vehicles	1	1	1	1	1	1	1	2	2	2
Diesel Vehicles	1	2	3	3	2	2	1	1	1	0
Other Mobile	6	7	6	7	5	5	5	5	4	4
Gasoline Fuel	0	0	1	1	1	1	1	1	2	2
Diesel Fuel	6	7	5	6	5	4	4	3	3	2
Other Fuel	0	0	0	0	0	0	0	0	0	0

Table 4-56

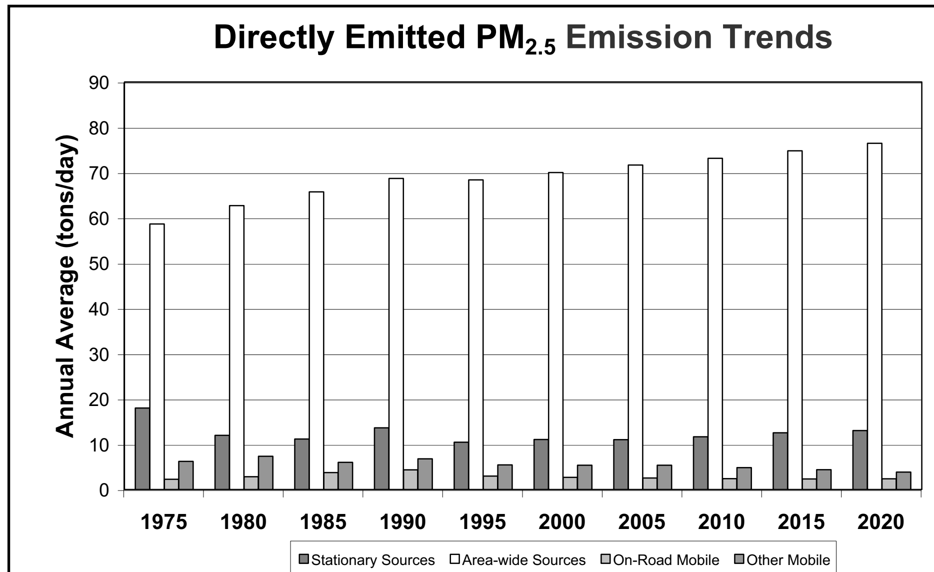

Figure 4-55

Sacramento Valley Air Basin

PM_{10} Air Quality Trend

The annual average of quarters (State) in the Sacramento Valley Air Basin shows a fairly steady decline over the trend period, with some variability over the last several years. The three year average of the annual average of quarters (State) shows a decrease of about 24 percent from 1989 to 2003. The number of exceedance days also decreased. During 1988, there were 183 calculated exceedance days of the State 24-hour standard, compared with 66 days during 2003. Because many of the sources that contribute to ozone also contribute to PM_{10}, future ozone emission controls should improve PM_{10} air quality.

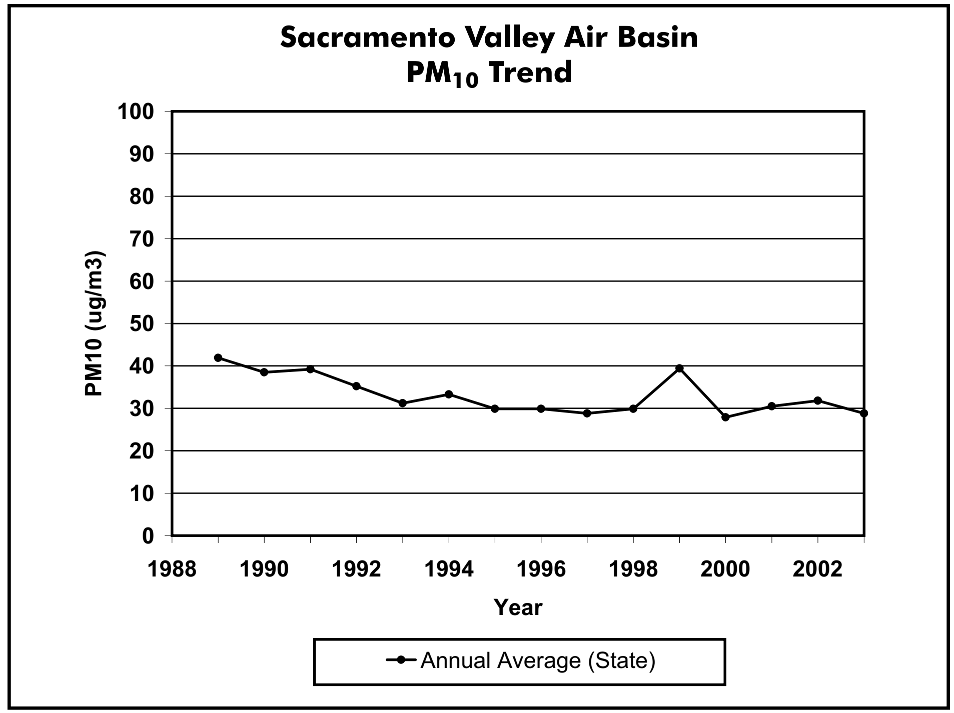

Figure 4-56

PM_{10} (ug/m3)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Maximum 24-Hr. Concentration (State)					100	147	153	136	111	113	154	145	98	126	130	179	90	112	96	83
Maximum 24-Hr. Concentration (Nat)					115	139	153	136	111	110	154	145	98	126	130	179	86	105	92	81
Annual Average (State)						41.9	38.5	39.2	35.2	31.2	33.3	29.9	29.9	28.8	29.9	39.4	27.9	30.5	31.8	28.8
Annual Average (Nat)					42.8	41.9	41.7	42.3	34.7	31.8	34.5	30.1	29.8	28.6	29.0	38.4	27.9	30.2	30.9	28.4
Calc Days Above State 24-Hr Std					183	134	175	189	177	92	108	108	129	65	97	144	81	96	126	66
Calc Days Above Nat 24-Hr Std					0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0

Table 4-57

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Sacramento Valley Air Basin
Carbon Monoxide Emission Trends and Forecasts

Emissions of CO declined in the Sacramento Valley Air Basin between 1980 and 2000 and are projected to decrease through 2020. Motor vehicles are the largest source of CO emissions. With the introduction of new automotive emission controls to meet more stringent emission standards, motor vehicle CO emissions have been declining since 1975, despite increases in VMT. Stationary and area-wide source CO emissions have remained relatively steady, with additional emission controls offsetting growth.

CO Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***2970***	***2981***	***2851***	***2517***	***1902***	***1482***	***1224***	***1035***	***909***	***833***
Stationary Sources	27	28	16	51	39	42	46	48	52	54
Area-wide Sources	294	309	320	333	330	331	334	337	341	346
On-Road Mobile	2450	2389	2246	1813	1225	822	576	398	268	187
Gasoline Vehicles	2442	2377	2228	1793	1210	808	565	389	260	180
Diesel Vehicles	8	12	17	20	16	13	12	9	8	7
Other Mobile	199	255	269	321	307	288	268	252	248	246
Gasoline Fuel	147	192	215	263	255	240	221	206	202	201
Diesel Fuel	36	44	37	41	36	31	28	26	25	23
Other Fuel	16	20	17	16	16	17	19	21	22	22

Table 4-58

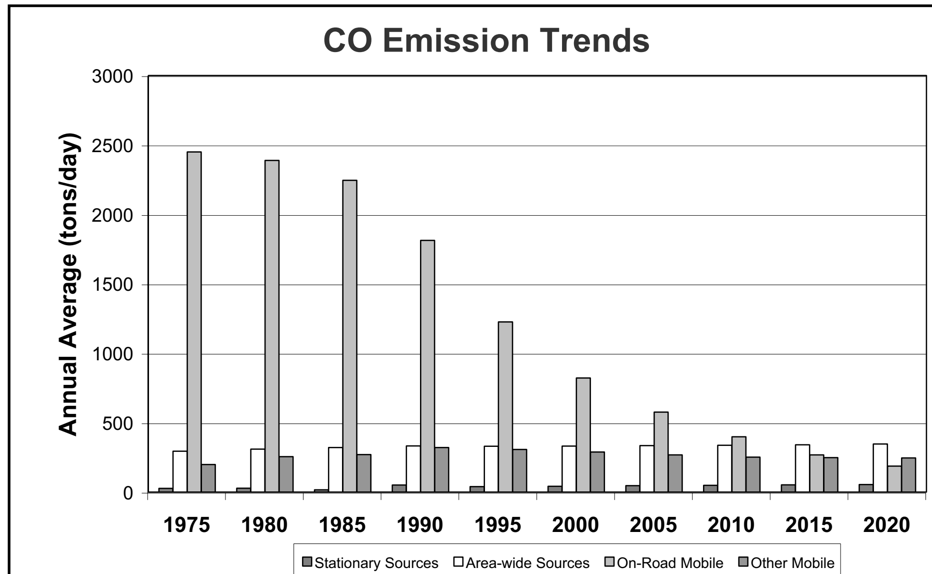

Figure 4-57

Sacramento Valley Air Basin

Carbon Monoxide Air Quality Trend

The trend of the maximum peak 8-hour indicator for carbon monoxide for the Sacramento Valley Air Basin was relatively flat from 1984 to 1991, with some year-to-year variability that was probably caused by meteorology. Since 1991, indicator values have decreased substantially. The 2003 value was 70 percent lower than the 1991 value. The national CO standards have not been exceeded since 1991, and the State standards were last exceeded in 1993. Much of the decline in ambient carbon monoxide concentrations is attributable to the introduction of cleaner fuels and newer, cleaner motor vehicles. These controls will help keep the area in attainment for both the State and national CO standards.

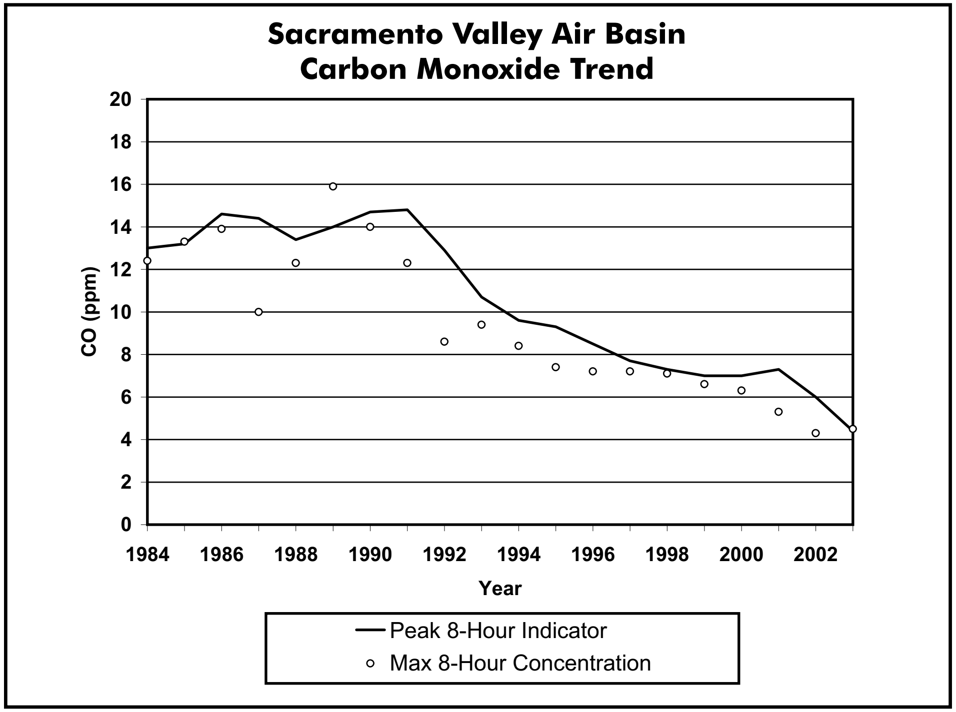

Figure 4-58

CARBON MONOXIDE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Peak 8-Hr. Indicator	13.0	13.2	14.6	14.4	13.4	14.0	14.7	14.8	12.9	10.7	9.6	9.3	8.5	7.7	7.3	7.0	7.0	7.3	6.0	4.4
Maximum 1-Hr. Concentration	18.0	17.0	20.0	15.0	17.0	18.0	17.0	15.0	14.0	12.0	10.8	9.8	8.7	9.5	7.9	7.7	10.0	19.1	7.8	8.5
Maximum 8-Hr. Concentration	12.4	13.3	13.9	10.0	12.3	15.9	14.0	12.3	8.6	9.4	8.4	7.4	7.2	7.2	7.1	6.6	6.3	5.3	4.3	4.5
Days Above State 8-Hr. Std.	6	12	13	5	12	22	14	9	0	2	0	0	0	0	0	0	0	0	0	0
Days Above Nat. 8-Hr. Std.	5	12	12	3	9	22	12	6	0	0	0	0	0	0	0	0	0	0	0	0

Table 4-59

Sacramento Valley Air Basin
Nitrogen Dioxide
Oxides of Nitrogen Emission Trends and Forecasts

Emissions of NO_x show a steady decrease from 1990 to 2020. On-road motor vehicles and other mobile sources are by far the largest contributors to NO_x emissions. More stringent mobile source emission standards and cleaner burning fuels have largely contributed to the decline in NO_x emissions.

NO_x Emission Trends (tons/day, annual average)										
Emission Source	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**
All Sources	***329***	***356***	***351***	***384***	***337***	***295***	***246***	***200***	***162***	***137***
Stationary Sources	36	30	29	43	45	41	38	40	40	40
Area-wide Sources	7	8	8	9	8	8	8	8	8	9
On-Road Mobile	179	194	208	216	182	147	113	80	53	36
Gasoline Vehicles	147	148	143	132	112	78	54	38	25	18
Diesel Vehicles	32	46	65	84	70	68	59	43	27	18
Other Mobile	107	124	107	115	102	99	86	72	61	53
Gasoline Fuel	3	3	4	5	5	6	7	7	6	6
Diesel Fuel	103	118	100	108	95	91	76	62	52	44
Other Fuel	2	2	2	2	2	3	3	3	3	3

Table 4-60

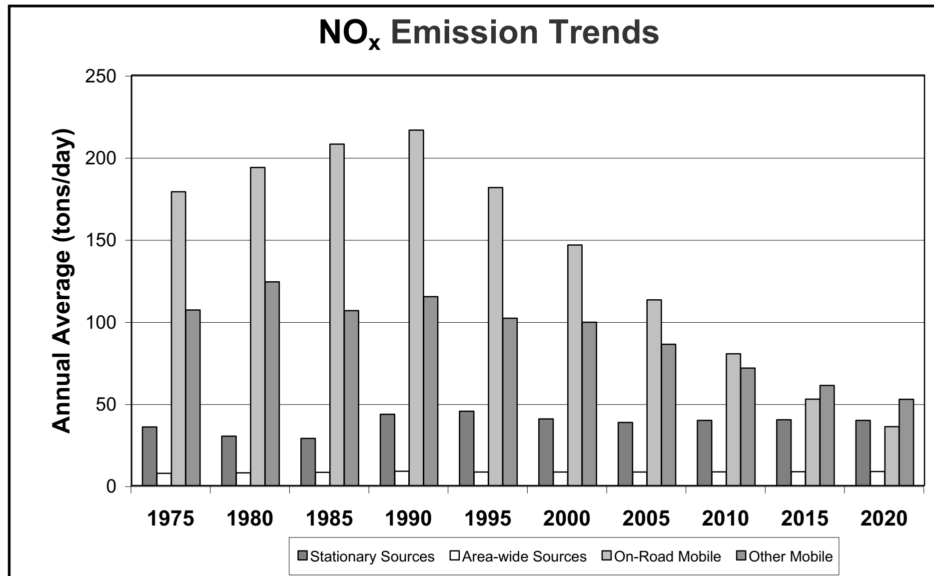

Figure 4-59

Sacramento Valley Air Basin

Nitrogen Dioxide Air Quality Trend

The Sacramento Valley Air Basin has attained both the State and national nitrogen dioxide standards for more than twenty years. The peak 1-hour indicator increased from 1984 through 1993, and has declined by almost 30 percent since 1993. There is more variability in maximum 1-hour concentrations as compared to other areas. This variability may be due to changes in emission sources or also may reflect year to year changes in meteorology. However, ambient concentrations are well below the level of the two standards, and a continuing decline in NO_2 concentrations is expected to continue.

Nitrogen dioxide is formed from emissions of oxides of nitrogen, which also contribute to ozone. As a result, the majority of the future emission control measures will be implemented as part of the overall ozone control strategy. Many of these control measures will target mobile sources, which account for more than three-quarters of California's oxides of nitrogen emissions.

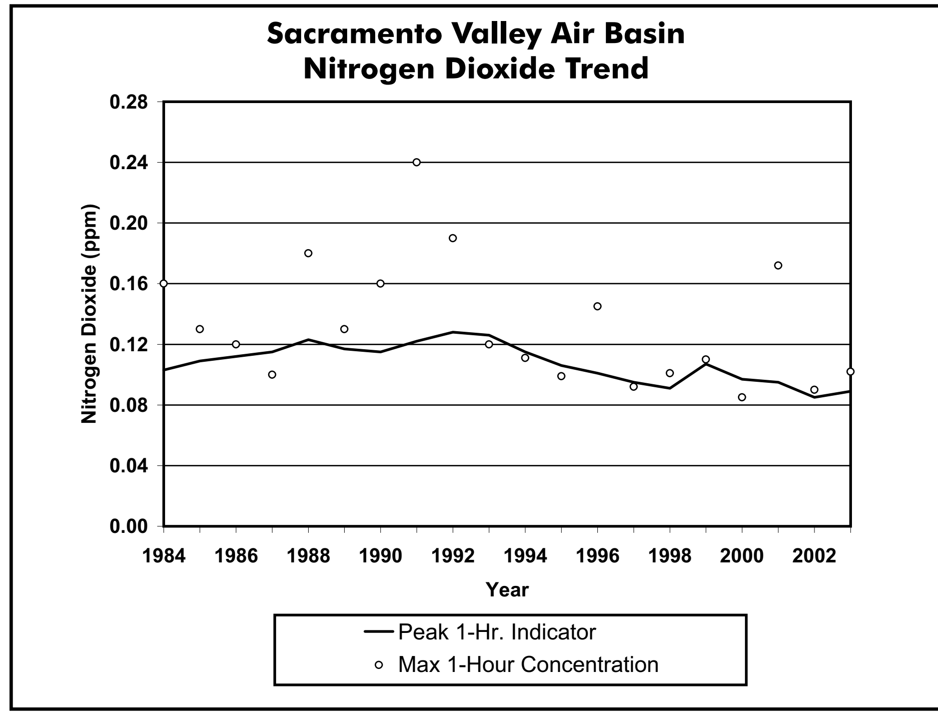

Figure 4-60

NITROGEN DIOXIDE (ppm)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Peak 1-Hr. Indicator	0.103	0.109	0.112	0.115	0.123	0.117	0.115	0.122	0.128	0.126	0.115	0.106	0.101	0.095	0.091	0.107	0.097	0.095	0.085	0.089
Maximum 1-Hr. Concentration	0.160	0.130	0.120	0.100	0.180	0.130	0.160	0.240	0.190	0.120	0.111	0.099	0.145	0.092	0.101	0.110	0.085	0.172	0.090	0.102
Maximum Annual Average	0.019	0.021	0.022	0.022	0.025	0.019	0.023	0.024	0.021	0.017	0.022	0.022	0.022	0.019	0.021	0.021	0.019	0.019	0.020	0.015

Table 4-61

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